ARMY ORDNANCE

VOL. XVI, No. 93 NOVEMBER-DECEMBER, 1935

Organization for Defense

Brig. Gen. Benedict Crowell

The Art of Victory

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Peace, War and Munitions

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Our Lines of Defense

Ralph E. Flanders

Preparedness in Perpetuity

An Editorial

A BIMONTHLY REVIEW OF AMERICAN MUNITIONS
PUBLISHED BY THE ARMY ORDNANCE ASSOCIATION, WASHINGTON, D. C.

RELOADER NEWS

No. 3 Published by the *HERCULES POWDER COMPANY* Wilmington, Delaware
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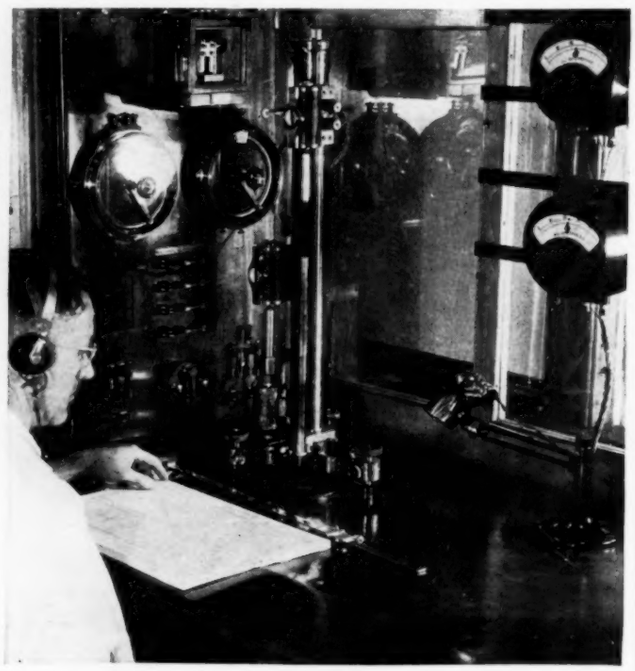

Operator checking velocity with Boulengé chronograph at Hercules ballistic house, Kenvil, N. J.

VELOCITY TESTS MADE BY FINE CHRONOGRAPHS

Probably the finest velocity measuring equipment in this country is that at the modern ballistic house of Hercules Powder Company at Kenvil, New Jersey.

Four Boulengé chronographs, considered the most accurate instruments for this type of laboratory use, are kept in excellent condition by the ballistic house crew, and thus record velocities with unusual accuracy.

The principle of the Boulengé chronograph is relatively simple. A cylindrical bar (in center of cut) is suspended by a magnet. When the rifle is fired in the gallery, the bullet, striking a fine wire as it leaves the muzzle, opens the circuit and the bar drops. However, before the fall has been completed, the bullet strikes a plate at the end of the range, thus causing an electrical device to nick the rod as it falls. By measuring the distance to the nick on the bar, and knowing the distance of the target range, the velocity can be calculated.

Precision measuring equipment is one reason for the extreme accuracy of the ballistic information and data contained in the new Hercules booklets and leaflets. Other equipment is of the same high quality, and great care is exercised in every detail to make certain that tests are conducted with the greatest degree of accuracy.

LOADS NOW AVAILABLE FOR MANY CARTRIDGES

A new series of leaflets, giving suggested charges for many popular cartridges, is now offered without charge to reloaders by Hercules Powder Company.

Recognizing the need for a series of booklets of this type, extensive laboratory work was started some months ago, culminating in accurate up-to-date ballistics.

Loads are made available for the following cartridges: .25/35 Winchester, .25 Remington, .250/3000 Savage, .270 Winchester, .30 W.C.F., .30/30, .30 Remington, .30-40 Krag, .30-'06, and .300 Savage.

Many loads are included for each cartridge, but, by interpolating, it is possible to plot weight of charge against pressures and velocities and thus devise many more loads for trial.

In printing these leaflets, Hercules ballistic engineers point out that maximum loads should not be exceeded in any instance, and under no circumstances should given pressures be exceeded.

Leaflets will be forwarded on request.

Booklet Published on Hercules Unique

A 24-page booklet, entitled "Hercules Unique for Rifles," supplements the recently published "Bullseye and Unique Revolver and Pistol Powders."

The new booklet lists ballistics of many popular cartridges, ranging from the .22 caliber to .45 caliber and including different types of bullets in each group.

For nearly forty years, Hercules Unique has been known generally to reloaders as a stable and dependable powder for low-power or gallery loads for all caliber rifles.

It ignites easily and burns cleanly and uniformly under practically all conditions. These characteristics account for its accuracy and uniform performance at low, as well as at moderate, pressure levels, regardless of the size or shape of the cartridge or the location of the small powder charge in large volume cartridge cases.

Hercules Unique is virtually unaffected by heat, moisture, and age. Its chemical stability and keeping qualities are unusual. Some Unique Powder, manufactured in 1908, still retains its original strength. Another sample has been under water for the past 36 years and when the surface water is removed by means of blotting paper, the powder still gives normal ballistics.

The various loads of Hercules Unique Powder are published as a guide to the reloader in developing the best load for his particular gun. Rarely do two guns shoot exactly alike and consequently the hand loader has the opportunity of adjusting his powder charge and varying the components to obtain the maximum accuracy in his individual arm.

Unique Powder is used chiefly for reduced or intermediate loads with lead bullets where accuracy rather than great killing power is essential. It is doubtful if accurate velocity figures are of vital interest to the shooter who should concern himself more in balancing the powder charge and lead bullet to fit his particular gun.

Since Hercules Unique Powder is intended primarily for use as a reduced-load powder, it is not recommended for maximum pressure loads in any center fire rifle cartridge.

It is always advisable to use an accurate scale or apothecary's balance to check the weights of charges thrown by any adjustable measure. By taking this precaution, the reloader will avoid mistakes in reading or setting the scale. Also, check weighing will eliminate errors which might be caused by mishandling the measure and will disclose faulty calibration.

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ARMY ORDNANCE

The Journal of the Army Ordnance Association

Now in its Sixteenth Year of Publication

Pledged to Public Service in Effecting Industrial Preparedness for War as Our Strongest Guaranty of Peace

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Volume XVI **NOVEMBER-DECEMBER, 1935** **No. 93**

CONTENTS

		PAGE
General Malin Craig, Chief of Staff, U. S. Army		Frontispiece
Organization for Defense	By Brig. Gen. Benedict Crowell	139
The Art of Victory	By Bernard M. Baruch	140
Peace, War and Munitions	By Newton D. Baker	143
Origins of Our Modern Guns	By Col. Rogers Birnie	147
Our Lines of Defense	By Ralph E. Flanders	154
Keeping the Record Straight (A reply by Maj. Gen. William Crozier, U. S. A., Ret.)		155
Defense of the Suez Canal (Conclusion)	By Fred. H. Wagner	158
Ordnance Day 1935		169
Editorial		171
General Malin Craig, Chief of Staff—Infantry Mobility and Fire Power—Ordnance Marksmen—Preparedness in Perpetuity.		
Association Affairs		175
Regular Ordnance Officers and Their Stations—New York Ordnance Reserve Officers' Meeting.		
Ordnance Field Service		180
Ordnance Activities in the Theater of Operations, Part I, By Maj. Raymond Marsh.		
Book Reviews		183
Index of Advertisers		199

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"The security of our coast cities against foreign attacks should not rest altogether in the friendly disposition of other nations. There should be a second line wholly in our own keeping. I very urgently recommend an appropriation at this session for the construction of such works in our most exposed harbors."—*President Benjamin Harrison, First Annual Message, December 3, 1889.*

The Army Ordnance Association

THE Army Ordnance Association is a national organization of American citizens pledged to industrial preparedness for war as our nation's strongest guarantee of peace.

The Association endeavors to keep alive an interest in and knowledge of the design, production and maintenance of munitions. Other than a few manufacturing arsenals—six in all—there is no peace-time industry for the production of ordnance. Should war unhappily come again, industrial America will be called upon to produce munitions in great quantity and of intricate and unusual design. In an emergency time will not permit careful study or long preparation for the production of munitions. The problem is one of vital concern.

THE Army Ordnance Association believes that the solution of this problem, based on experience, lies in an active organization at all times coöperating with the Government. The principal objective of the Association is an active membership of American citizens, on whom the duty of design and production of munitions will fall in war, who will have an accurate and authentic knowledge of the complex requirements of ordnance. "Peace insurance" in this form is the foremost aim of the Army Ordnance Association.

The Association is devoted solely to the national defense; it has no commercial interests, no political alliances, and no religious affiliations. It is not operated for profit: its income is expended in furthering its aims. Its officers and directors serve without remuneration.

ARMY ORDNANCE, the journal of the Association, is published solely for the purpose of disseminating information on the progress of our munitions developments so that American industry may at all times know its responsibilities to the common defense.

The objectives of the Association as set forth in its Constitution are:

To assist in effecting industrial preparedness for war as being one of the nation's strongest guarantees of peace;

To keep available the highly specialized knowledge necessary for arming the manhood of the nation by stimulating interest in the design and production of ordnance material;

To promote mutual understanding and to effect cooperation with American scientists, inventors, engineers and manufacturers in civil life and the regular and reserve officers of the Ordnance Department;

To provide, when required, the services of competent committees to investigate and report upon special ordnance subjects;

To assist in developing and maintaining an efficient personnel, both commissioned and enlisted, for the units required for Ordnance Field Service in the event of an emergency;

To commemorate the services rendered by the industry of the nation and by the officers and civilian employees of the Ordnance Department in the wars in which the United States has been engaged.

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Harris and Ewing Photo

General Malin Craig

Chief of Staff, U. S. Army

ARMY ORDNANCE

Volume XVI NOVEMBER-DECEMBER, 1935 No. 93

Organization for Defense

Industrial Preparedness Is Our Vital Responsibility

By Brig. Gen. Benedict Crowell*

AS President of the Army Ordnance Association it gives me a great deal of pleasure to welcome you to what we all consider to be a very noteworthy occasion. We are met for a dual purpose: first to pay honor, where honor is justly deserved, to three of our distinguished fellow citizens whose names and deeds are immortal in the annals of our national defense. Secondly, to rededicate ourselves to those principles which our organization took as its special field of activity seventeen years ago— industrial preparedness as one of our nation's strongest guarantees of peace. Both purposes are of special significance tonight.

May I say just a few words at the start as to the broader aspects of our organization? I fear that recent events throughout the world and particularly in our own country call for a restatement of the principles to which we attest our loyalty. Seventeen years ago our Association was formed. The idea which gave it birth was deep in the crucible of bitter experience. Those of us who were responsible for our organization saw the great need for some living method of perpetuating the lessons of our World War experience. We cannot repeat too often for our own edification and for the guidance of those who have forgotten that the World War proved beyond doubt that this great nation of ours can mobilize and train its manpower at a far greater speed than it can mobilize its industrial power to produce the equipment of defense. The country at large realized this in 1920 when its representatives wrote into the organic law of the land the National Defense Act. This act provided for the first time a recognition of the importance of industrial preparedness and prescribed in general terms the methods by which this type of preparedness is to be made effective. Hand in hand with this law our organization has helped chart the way and has kept alive among industry and our civilian engineers some realization of the task which is theirs should war ever come to us again. Ours is a great responsibility. How able or how effective we have been is not for us to say. But at least there is this very consoling thought: our national defense from the standpoint of capacity and ability to produce the complex requirements of our military objective is a thousand times better off than it was twenty years ago.

Here let me say that ours is not a militaristic organization. I candidly feel that our membership, small though it be, represents a body of the most practical pacifists to be found anywhere. We loathe war as an instrument of national policy—we loathe it as candidly and as sincerely as any human being can, because we are guided by the lessons of experience. We are not so idealistic as to believe that war is a thing of the past—indeed it is very much in the present. Some years ago our organization was referred to as being "practical, realistic and hardboiled." We are that and we are proud of it. We love peace and favor every possible means of perpetuating peace. But we refuse to harken to the demagogue who, not content with his unfair, and most of the time untruthful, methods, is today leading our people astray as to the real meaning of national defense and how best to provide it when needed.

WE are living in an era of much silly thinking. Men and women in their zeal to find a way to prevent war have of late seized upon the inanimate objects with which battle is waged as if implements of iron and steel, copper and chemicals, are themselves capable of violating the canons of peace. Further than that, inroads are being made by the agitator upon an unsuspecting populace challenging the motive of those who know the real purpose of military armament, the lack of which in time of necessity in the history of our country is written so large. We can only hope that the day is not far distant when sound thinking will prevail in this field, when the meaning of national defense in its true light will be accorded the recognition it requires. We are not interested in the glorification of war, we are not striving for inordinate profits for anyone; we believe that the burdens of war, should it in the providence of God come, must be borne to the best of the ability of every citizen. But over and above all this, we are convinced that adequate national defense is a preventative of war and that national effectiveness in an emergency is mandatory.

Therefore I call upon you all to dedicate yourselves to the principles which our Association has fostered for nearly a generation. Our membership is pitifully small; it should grow until it includes everyone who has a job to do in the great task of industrial mobilization. I urge you to hold high the banner of industrial preparedness, defend it against its calumniators and do your part constantly to the end that if our industrial strength must ever again assert itself in time of war we can meet the problem without the delay, the waste, the tragic loss of blood, time and money which our ignorance and lethargy cost us heretofore. No greater responsibility faces the people of the United States.

As you know, and as I have already indicated, we are gathered tonight for another purpose. Realists that we are, we esteem public service in peace and in war and we are met to pay tribute to three great personages all of whom, in the stress of conflict or in preparing for defense, have served their country with an idealism, a practical leadership and an enduring effectiveness. In conferring well deserved honors upon these gentlemen indeed do we honor ourselves.

*President, Army Ordnance Association. The Assistant Secretary of War and Director of Munitions during the World War.

Editor's Note: This is the opening address delivered at the Seventeenth Annual Meeting of the Army Ordnance Association, The Mayflower Hotel, Washington, D. C., October 2, 1935. The other addresses, in the order in which they were given, are published on the following pages.

The Art of Victory

Demagogy Cannot Divert a Great Public Purpose

By Bernard M. Baruch*

NO man or woman who saw anything of the Great War can be other than a lover of peace. Hundreds of millions of people were touched by that conflagration while it burned, or by the dead ashes that strewed the world when the flames were extinguished. All except the newest generation have been hurt by that bitter experience. All have suffered or are suffering from its tortures. All profess a hunger for peace—all cry "Peace, peace, but there is no peace!"

Today, twenty-one years after the outburst of the volcano that shook the world, we see humanity in arms and embattled. Yet on all sides we hear the protestations of goodwill. Each nation wants peace but wants it made in its own image. The Russians who preach a doctrine, the very essence of which is abhorrence of war, qualify that by saying they abhor only capitalistic wars. The Germans—I quote Hitler who said, in his so-called "Peace" speech of May 21, 1935, that "nowhere in the world had peace and pacificism found so sure a home as in Nazi Germany" and adding, "the character of our new constitution provides us with the possibility of putting a stop to the efforts of the war agitators in Germany." Hitler and Peace! The very terms are anti-thetical! He is today the greatest menace to world safety. Italy is preaching peace which, as she sees it, rests upon "security" gained by the absorption of Ethiopia. France pleads for a peace that will guaranty her against her Northern and Eastern neighbor. The Little Entente is intent upon a certain type of peace. Japan is so determined upon peace that she will obtain it if she has to annex all China in the effort. England wants peace, but there are certain conditions that would make her forego it. America is set upon peace—and I would be the less an American and the more a cynic if I did not say, quite free from bombast, that my long years of study and experience have taught me that our country is perhaps freest from insincerity in her attitude.

I SHALL not remind this learned assemblage of the assertion of war as a biological factor. There are other phases of the subject heavily impregnated with humbug to which I wish to devote my attention. Perhaps none is more illustrative of our paradoxical processes than that we talk of peace but think of war. My own presence on this stand today is proof of that. You give me a medal, and I am flattered and touched by the gift. I shall believe, because I want to believe it, that it is deserved. But it is given me, not for such effort as I have been able to expend in behalf of peace but for such part as I had in helping our country win the last war, for, never forget that for the war to have been won as it was won and when it was won, was due solely and entirely to the entrance of America! And, too, this deeply appreciated souvenir has been bestowed upon me for the plan and counsel I was able to give to the effort to put America in such shape as to be ready for another war should it come, which God forbid.

A varied and active life has taught me that war is an ever-present consideration in national existence. I happen to believe, although I fear that I am one of a minority in this faith, that a heaven-born opportunity once existed, if not for the complete elimination of war from the world then, at least, for the beginning of a process that would have made war increasingly difficult and correspondingly rare. I mean the League of Nations. I mean a *real* League of Nations with everyone in it,—not a counterfeit League. To me the League should mean a concerted effort to bring issues to their conclusion through the force of reason and *not* through the force of arms.

I do not now advocate America's entrance into the League. We are not ready for that, nor is the League as it now exists, ready for us. But I am heartily in favor of any plan of internationl coöperation which aligns us on the side of Peace. Perhaps in another day a true society of nations will come into being. When that time arrives, or as a fuller coöperation is established, it will bring into new and stronger light, the name and acts of a great man who, detesting war, fought it successfully because he hoped it would be the end of war. I refer to Woodrow Wilson.

Although the League as it stands today is totally different from what it would have been had America entered, nevertheless its efforts in behalf of world peace, at this moment must awaken the admiration of any student of affairs. How successful those efforts are to be lies in the lap of the gods. It is a test of the League's right to live. Which nation will hold the bridge; which will desert for its own ends?

But were nothing else accomplished, the fact that the effort is being made is in itself an index of an aroused and growing spirit throughout the world. We have no direct part in the League operations, yet a similar manifestation is to be observed in America through the recent effort to declare and enforce a policy of neutrality. Such an act, to be binding upon our country should be equally enforced by other nations. I shall allude to this again.

THE difficulties attendant upon this adventure into neutrality are almost insurmountable. What is neutrality? How shall it be observed? What goods are to be listed as contraband? Should we be content by proscribing the shipment of actual weapons of war or should we go full length and embargo the shipment of any single commodity that has a contribution to make toward the life of a belligerent. It is easy to say rifles, cannon, shot and shell are to be interdicted but what of cotton? What of wool? Of copper? Of food? What of the hundreds of thousands of articles required for existence which all belligerents must obtain or suffer defeat?

Wars are no longer dynastic. They are entirely economic in their origin and that economic motive sometimes works two ways—one internal and the other external. For fif-

*Chairman, War Industries Board, 1918. Army Ordnance Association Medalist, 1935.

Editor's Note: This is an address delivered at the Seventeenth Annual Meeting of the Army Ordnance Association upon the occasion of the award of the Ordnance Medal of Merit to Mr. Baruch. The Mayflower Hotel, Washington, D. C., October 2, 1935.

teen years, I have been saying that the profit must be taken out of war. I like to think that I am one of the first to proclaim that doctrine. There are three highlights in the non-profit formula. I look at them this way:

1. Proclaim and define a neutrality that shall make plain what our people may or may not sell or do when other nations are at war.
2. Prevent our own embroilment by every effort that can be made.
3. If war be inescapable, then let us be sure first and foremost to win it. Eliminate all profit with its vast increase in the wealth of the few and the enormous dislocation following the close of hostilities. It is of course, this dislocation from which we are suffering today.

Wars are never won. Wars are only and always lost both by the victor and the vanquished alike. We can make a start toward preventing war; toward winning war should it come and toward preventing the loss of war after we have won it, by, as far as possible eliminating the profit that war brings and by paying as we fight as far as may be. But in eliminating profits, we must be careful not to eliminate our actual war defenses.

As I see it, our duty is plain. We should think Peace, talk Peace and act Peace, but if war comes, we should be prepared to fight it, to win it, and to survive it.

This is not the time nor the place to go into detailed analysis of my suggestions as to industrial mobilization with its corollary of taking the profit out of war. I summarize it as follows:

1. Put a ceiling over prices that will prevent a rise and protect the government and the civilian population whose needs must be second only to those of our fighting forces. The President to make whatever adjustment is necessary.
2. Place a tax that will take practically all the profits from war activities.
3. Raise all corporate and income taxes to the highest point possible but not so that they will stop the flow of munitions to our soldiers and the production of necessities for our home civilian population.
4. The power that the President now has to commandeer in time of war should be broadened to include the licensing, control and regulation of transportation, industry and finance. Let us get this power now, and if a constitutional amendment through an excess of caution is necessary, let us have that too.

THE idea of such a decoration as you give me is a constructive one. Don't suppose that it is not a most highly-prized treasure of even those most blest with other fruits of a fortunate life. They tickle the vanity of the vainest and are not pressed aside by the meekest of men—whether either deserves them or not. It is easy for all of us to argue ourselves into believing that we deserve what we get—if only it is good. When you can puff out that chest of even an old fellow like me, who is beginning to perceive the vanity of all bright bits of metal, you can bring a glow of pride to anybody.

During the recent Congressional investigations, it must have been trying for our armed forces and all those who for years have urged and studied the national necessity of mobilization to see their statements and efforts twisted in an effort to make a cheap political point, and especially to be told that, to bring their experience to bear in preparing the country for war, was like asking Dillinger to write an anti-gangster law. I, too, have had my share of that but this great public purpose cannot be diverted by demagoguery.

After that attempt to discredit the suggestions you made, in favor of wholly impractical political or amateur proposals, it must have been with a great sense of satisfaction that you gentlemen of the Army saw the *final* recommendations forced, by the logic of your presentation, squarely back toward your original proposals.

The gratituous criticism and many mistatements of fact—straw men set up for the purpose of knocking them down—these are annoying but unimportant. The important thing is that the right principles shall prevail in the end. We cannot leave to bunglers the fate of our nation. It will be too late to change after defeat.

Because we know something of war, we are opposed to it. I think the more men know, the more they oppose. There is no limit to which we will not go to escape modern conflict in which the whole population of nations is sucked into present privations and filled with fierce emotions which sometimes do not die in a generation. We know the social and economic aftermaths which sometimes seem to threaten the destruction of existing forms of social systems.

We must prevent war. That means organizing for peace. The first step in this is to let the world know that the strong cannot bully the weak, or move against the better conscience of mankind backed by a universal determination to fight, if necessary, for international justice and decency.

In this country we have made a significant start toward that goal but I would not have you think that I am so completely a dreamer that I stand ready to urge our country into a complete neutrality regardless of the action of the other nations. I submit that such an action, which has as its purpose the attainment of justice and decency, should be participated in by every non-belligerent. I am sufficiently crass to say that if cotton is to be sold to a country from which it may find its way into the hands of a belligerent, then America should have the right to sell that cotton unless and until every other country agrees to withhold its supply. And so too, with every other staple. Look at Germany. She is today, according to the press, selling munitions and other supplies to both Italy and Ethiopia. Why should we continue to be the great international Fat Boy, at whose stick of candy other nations take an unwelcome bite. It would be somewhat malapropos to talk of war debts at this time yet when the air is resonant with protestations of the sanctity of treaties, what about them?

But we should always keep in mind the ever present danger that strict neutrality carried to its ultimate end is almost certain to result in war because, in itself, it becomes an act of war. This may be questioned by the casuists but it is susceptible of easy and practical demonstration.

LET me for a moment leave the international for the national state. So many of our inexperienced friends make the dangerous mistake of naïvely believing that rules for industrial mobilization are to be made only for the warring elements of our population. Nothing is further from the fact. It ignores the great necessities of such a situation. The supply and the welfare of the civilian population is an even greater problem than the supply of the armies. Without brightly burning fires of morale at home, the spirit of

the soldier in the trenches is dead. Without food and shelter and clothing for the home population, you cannot maintain an efficient fighting force. So it follows that we must prevent deprivations and profiteering at the expense of civilians with as sure a hand as we prevent the exploitation of the government acting for its soldier.

Pardon this personal word; what disturbed me most in the recent Congressional discussions over the subject of munitions was the constant and willful misrepresentation that I looked upon the ceiling over prices as all that was necessary to stop profiteering and inflation. Nothing could be farther from the truth. I made it very clear that I advocated such a ceiling only as a beginning in order to stop price rises but, and I pointed this out a few minutes ago, that all profits due to war should be taken by taxation on the law of diminishing returns.

The world knows that modern war will take all that every nation has to give—its entire economic strength diverted from the purposes of peace to the awful ends of international destruction. The skill with which that diversion is planned, for speed and effectiveness, is the whole art of victory. To be quickly ready to spend all and to be all spent!

I know that you have planned well. I know that you are organized and inspired to keep those plans alive. I commend your work to your country. I thank you for the honor you have bestowed upon me and the privilege you have given me to be here.

Editor's Note: No more correct analysis, in our opinion, has ever been presented on industrial mobilization in time of war than that originally offered by Mr. Baruch to the War Policies Commission in 1931. The following extract relating to the "draft everything" fallacy is taken from his brief "Taking the Profit Out of War" as submitted to the Commission:

"THE total of our expenditure for the World War was thirty-nine and one-half billion dollars. The nearest antecedent census estimate of total national wealth was one hundred and eighty-six billions in 1912, of which only 1.4 billions was in gold and silver bullion. Real estate, plant and equipment (including railroads) was 141,000,000,000. Transportation systems (except railroads) was 10,000,000,000 and all other forms of wealth (agricultural, manufactured and mining products, clothing, furniture, carriages, etc.) was 34,000,000,000. It is interesting to inquire how the war could have been financed by confiscating any or all of these items. The billion and a half in hard money would not have been a drop in the bucket if all had been taken. As to the seizure of physical properties their use for finance would require resale. But who, under the patent threat of reconfiscation would buy such properties? And since such capital levies would of course first reach the more liquable forms of wealth, who would have anything to buy them with? There may be an idea that seizure would nevertheless finance war because we would simply take war material without paying for it. The error in this is that there is no considerable amount of material available for war under peace conditions. It has to be manufactured from raw resources. The bulk of all fabricated costs are labor costs. We cannot conscript labor, therefore we would have to pay labor and that requires finance. There being no available war material for seizure no one would expend his money to produce war material merely to have it seized as fast as he made it and without reimbursement. The whole idea is absurd.

"There has been a good deal of talk of drafting dollars. Even if there were ample Constitutional authority there is a very cogent reason why that could not be done. Every man with fair warning that his dollars were about to be taken away from him and never given back would cause them to disappear with amazing rapidity on the first rumor of war. The experience of France and Germany in attempting to draw existing distributed supplies of gold into their treasuries for war purposes clears this point. The gold went into stockings, baking powder cans and other convenient receptacles and these into the ground. Panic stricken efforts in every direction to avoid such confiscations would disarrange the whole fiscal structure of the country and, adding to the general confusion and dislocation caused by invocation of the broad principles of confiscation, would paralyze the country's sinews of war at the outset. No project more destructive of adequate defense could be conceived.

"It is also pertinent to ask on what theory of assessment could such confiscation of property for financing war proceed? If—as under the present theory of commandeering *with compensation*—the new idea would be simply that the government should take the first property that came to hand arbitrarily and without equalization, we could have a complete subversion of the very purpose of all government. No such political system ever existed and there can be no question that such is not the purpose of the suggestion. If the thought be that government shall take equably from all those who own, it is simply a process of capital levy in the form of tax. Nothing in our war experience has ever indicated a necessity for this. No belligerent nation of the World War even at the limit of its extremity ever adopted the capital levy and it seems unnecessary to believe that the resolution intended such a thought in this connection.

"This government has unlimited power of taxation in the fields allotted it by the Constitution—by income tax, by duties, imposts, excises and all forms of indirect taxation and by capitation or direct tax in proportion to census determinations. The power to tax is the power ultimately to appropriate and in this nation it is sufficient to any current levy that ought (in prudent administration) ever to be assessed against any generation in any single year.

"I think I was the very first advocate of the plan to take the profit out of war and to make every man, dollar and thing bear an even proportion of the burdens of war. I hold no brief for especial protection of wealth in war but my experience tells me that the draft of dollars is quite as absurd and impossible as the draft of labor. For reasons elsewhere considered such wholesale impressment is both impossible and unnecessary, but in the considerations under this heading it is crazy. The fiscal strength of a nation lies not in what government owns *but in what its people own*. The sinews of war are not dollars—they are efforts. In order to produce things, money is necessary but it is not necessary that government *own* the money by taking it away from the people who do. Monetary wealth is potential productive capacity just exactly as a factory is and, exactly as the factory capacity of the country must be administered, rationed and controlled for war purposes in order that the vastly increased demands of war may be met and, at the same time, that the normal requirements of the civil population be not denied, so must wealth be similarly administered, rationed and controlled."

Peace, War and Munitions

The Testimony of a Realist Who Knows the Facts

By Newton D. Baker*

IT will not be surprising to any of you to have me say that this occasion, and this medal stir in me many memories of a tragic story. They recall hours and days of great responsibility. They recall periods of deep anxiety, and they also, happily, recall memories of fine men, both official and unofficial, who gathered around the War Department in those days of test and trial, and pooling their character and their intelligence and their experience, made America's effort in the World War the most triumphant demonstration of national success yet achieved in history by a democracy. That I should be the recipient of a medal at your hands fills me with a certain humility and I am obliged to say, because it is no secret to those who are in this room and who were in the War Department in those days, that I knew very little about ordnance.

I remember very well how we used to have a room in the War Department in which charts were posted twice a week to indicate the progress of our preparation. They were designed by skillful statisticians and were made to tell at a glance of the eye just what the pinch points in our preparations were. I still sometimes dream that I see a pinch point and hear myself ask a question which I asked very many times, it seems to me, "Well, why is there trouble about boosters and adapters?"

I always had a feeling that those who were in charge of ordnance in those days thought that my political experience ought to have been available to aid them over the difficulty of boosters and adapters, but apparently it was a non-political subject. As a matter of fact, the Ordnance Department in those days, speaking strictly of the officer component of the Ordnance Department, had great good fortune, and this country had great good fortune, in that they were trained by a master scientist and a master mechanical engineer. I am glad on this account, but sorry on every other account, that General Crozier is not present, to have me say in his presence and to his friends, that his leadership of that department, and his great gifts to that department were a patriotic service of the highest order.

I SUPPOSE that if Mr. Baruch and I were to start out from our respective homes for Philadelphia that he would buy a ticket in New York and go South, and I would buy a ticket in Cleveland and go East, so that we would be starting from different places and we would be going in different directions, and yet we would be trying to get to the same place. And so, as I listened to him tonight, I had a perfectly serene confidence that he and I shared as our objectives the preservation of peace, and yet, in at least just one point, I think that we started at a different place and, perhaps, went in a somewhat different direction. I trust that he will pardon me for referring to it.

I do believe the United States ought to go into the League of Nations. I don't care very much whether they are ready for us or we are ready for them, I think that we ought to go in and get them ready and then get ourselves ready, if necessary. I am of the belief that in the last six months the League of Nations has done more than any agency in the interest of the preservation of world peace in the history of the world, in this: It has centered the intelligence and the consciousness of mankind upon a controversy, and it has aligned the opinion of the civilized world upon a thing which threatens the peace of the world in a more highly intelligent and powerful way than has ever before happened in the history of international controversy.

I have never believed that it was humanly possible for us to create a League of Nations or any other instrumentality, to which we could give an Aladdin's lamp or a fairy's wand, which by being rubbed or waved would change human nature enough to abolish the oldest and the most intemperant of the curses of mankind. I have believed this: that historically prior to this effort on the part of the race to establish a League, wars were started over-night for unknown causes. Sometimes they were very unhandsome causes, and the world reeled back from the announcement of a state of war in perfect ignorance of its cause, far too late to apply the multiplying and sometimes corrective impulses of an aggregated public conscience. Old wars used to start by copenhagening the enemy's fleet or by invading its territory. A diplomatic excuse was fixed up in the foreign office of the country going to war, some imaginary trespass upon national rights was used as a basis of propaganda to explain the incidence of the war and the world really knew nothing about it.

But here for the first time in human history, a controversy has been laid on the table and, in the presence of a seeing and hearing world, all that either side cared to say about that controversy has been heard patiently and in full. And perfectly dispassionate persons who had no interest except the preservation of the peace of the world have listened to those statements on the two sides, and have published them so that you and I know what they are. We are thus prepared to judge if anybody breaks the peace of the world in that controversy just why he does it and whether or not he is justified in doing it.

That seems to be an immeasurable advance. Lame as the League of Nations is—admittedly not such a League as President Wilson hoped it would be, for he foresaw a Council of Nations in the world which would meet in an atmosphere of economic concession and conciliation, and instead of that the League has not had, as members, all of the nations and has not met in an atmosphere of economic concession, but in an age of abounding economic nationalism, so that it has neither been the kind of a League in its membership nor has it had the atmosphere for its deliberation which its founder, Mr. Wilson, foresaw and desired, but lame as it is—it has done this thing which hasn't been done before in the world. It has brought international controversy out of the dark corners and spread it upon the front

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Editor's Note: This is an address delivered at the Seventeenth Annual Meeting of the Army Ordnance Association upon the occasion of the award of the Ordnance Medal of Merit to Mr. Baker, The Mayflower Hotel, Washington, D. C., October 2, 1935.

pages of newspapers and spread it to the ears of the world by radio addresses so that the common man in the street can judge of the righteousness of the cause.

AND, after all, what is war? Foch once said, "The object of war is to impose your will on your adversary." He said that at the time the armistice was proposed. There were people in Paris, particularly non-combatants I think, who felt that there ought not to be any armistice; that the war ought to go on until the Rhine was crossed and a triumphant entry had been made through Unter den Linden in Berlin to the old palace at the end of that great street. When that matter was put up to Foch his answer was the one I have quoted, "The object of war is to impose your will on your adversary. When that is accomplished no further loss of life can be justified."

Now, if that be a true definition of war, I think that we face this question: What is it that makes a national will which you want to impose upon an adversary? Quite obviously, it is some universally cherished national ideal. It may not be a good ideal, it may not be an universal ideal, and it may not be a wise ideal, but when some ideal takes possession of a people to such an extent that its achievement seems to them the most important conceivable object of human life, then you have this hot and vibrant thing which we call a national will and which we seek to impose upon those adversaries, those who thwart it or deny it, by the act which we call war.

Whether war is a good thing or a bad thing, therefore—intrinsically of course, war is a stupid thing—but whether a particular war is a good war or a bad war depends upon the righteousness and wisdom of the will which is sought to be imposed, and the wickedness and the obstructiveness of the will which opposes it. Therefore, I very much doubt abstractly and philosophically whether there is much in the doctrine of neutrality. Mr. Wilson once said that neutrality was a dead thing in the world, that the world had come to a place where it was no longer possible to be neutral. I wholly agree with what Mr. Baruch has just said, that there is no safety left in the doctrine of neutrality. It is perfectly manifest, I fancy, that to deny to a fighting nation something that it needs for the preservation of its life, puts you in the category of its enemies and it will so regard you whether you do it out of a spirit of enmity, or whether you do it under the spirit of neutrality. If I went out of this hotel after this dinner is over, and I saw a great ruffian of a man beating a child, and I passed by and said to myself, "I am going to be strictly neutral," I think that it would be a manifest to all persons who saw that action that I was neutral in a place where I had no right to be, and so I think that as a matter of conscience, that if we can really get as between two nations, which is right and which is wrong, and the League of Nations in its procedure is fast getting in to a place where it is going to enable us to make judgments of that kind, then it seems to me for us to be neutral while unrighteous strength crushes innocent weakness is in itself an immoral position for a people to take.

NOW, I am not unaware that I am speaking in the Mayflower Hotel. I have at home a questionnaire, one of the questionnaires to which Mr. Baruch referred. It comes from a Senate Committee and asks me to tell them how many times I have been in the Mayflower Hotel in the last year, whom I have spoken to there, and what I said to them and what they said to me! And so, some day, I suppose that I shall have to appear before the Senate Committee and say that on this particular day of October, I was in the Mayflower Hotel and you were all there, and I hope that my memory will contain all of your names at that time, and I will be asked whether I said that I was in favor of war. That is about as near as the Senate Committee is likely to get to an accurate statement of what I said.

I am going to make a list of your names and I am going to ask the Senate Committee to call you all before it to testify in my behalf, and I shall ask you to bear me out that I started by saying that both Mr. Baruch and I wanted to go to Philadelphia, and that Philadelphia is the City of Brotherly Love and our object in going there was a peaceful object.

And in saying what I have said to you about neutrality, I have not in the slightest degree desired to convey to you the idea that I thought it was the duty of the United States to be a knight errant in the world, buckling on its shield and taking its sword in its hand and going about trying to analyze everybody else's controversy, and making up our own independent mind as to who was right, and helping what we deemed the right as against what, for the moment, we deemed the wrong. No such quixotic attitude seems to be just either for persons or nations. I have said what I have said because if the League of Nations has advanced to the place where it can stay the hasty hand that would make war long enough, rigorously and in a dispassionate way, to inquire into the controversy and get its merits and set them before a world which can think and feel about it—when that day comes then I trust that America will be one of the nations which will be in a position to join with others, equally right minded and equally brave, to stand for the innocent and weak, no matter how powerful the strong oppressor at the moment may appear to be.

LET me say a practical word about peace. I think that I belong to every peace society in America. If I don't, I just haven't heard of them, and I will join them as soon as I do, and yet I am perfectly overjoyed to be here tonight at a meeting of the Army Ordnance Association. Like Mr. Baruch, while I love my ideals and try to serve them, I can't forget that this is an entirely practical world, and that the question of peace or war does not rest with us. There is no more tragic sentence written in the history of the World War, than that of Sir Edward Grey, told in Mr. Page's memoirs.

As Grey looked out of the window of his study and saw the blinking lights of London streets with the descending darkness, he said to Page, "As I look out here, the world I knew seems to be disappearing, and I wonder whether I will ever see that world again."

And Page said to him, "Sir Edward, whatever else may be said, when this is all over, the world will agree that you did your best to prevent it."

Grey looked thoughtful for a moment, and he said, "Page, I hope that will be the verdict of mankind, but about things of this sort, I have an almost uncanny feeling that there are cosmic forces moving unperceived by men, which come to culminations which no human effort whatever could control or even influence, that we are victims of circumstance, that we are the children of misfortune when nature makes up her mind to have one of these catastrophes."

And so in this world, organized as it is, the possibility of

war is still ever present. We have in America things far too priceless to mankind for us to believe with a childish sort of credulity that no war will ever come to us, and therefore, we will never be called upon to defend our inheritance, and can safely leave it undefended.

Now, there are many kinds of efforts made to advance the cause of peace. I have great respect for them. I don't want to be critical of any of them. Just so long as people are really headed for Philadelphia, even though they take a boat eastward across the Atlantic and are coming clear around the world to get there, so long as Philadelphia is the objective, they have my sympathy and I withhold my criticism.

I think that this observation can be made: That many of our peace-time plans, made in peace time for the preservation of peace, are unrealistic. Refrigerated peace plans, made in a cool atmosphere and locked up on ice, melt very rapidly when they are exposed to the tempestuous heat of an aroused public opinion. Many of the plans, particularly the neutrality plan to which Mr. Baruch has referred, and some of the plans about the limitation of armament I am afraid, (although I wholly sympathize with what Mr. Baruch has said about his program for taking the profit out of war and the way he proposed to do it, and the way he has done it once before, I think successfully) nevertheless, I think slogans of that sort are likely to be deceptive. When war comes and the national will is aroused, these pious resolutions we have made are acceptable to us only so long as they minister to our success in reaching our objective. My hope is that we will not place too much dependence upon formulas of that sort. Their spirit is wholly admirable, but their efficacy is open to doubt.

There is but one sure way to prevent America from becoming involved in a war, and that is to prevent there being a war in which she can be involved—that is sure. We may not be able to do that. War may break out some place in the world in spite of our best efforts. If it does, our next most strenuous effort ought to be to keep out of it, and if that can be done with safety to our ideals and justice to the heritage which has been intrusted to us as trustees for future generations of mankind both in our own and other countries, it will be through the providence of the Almighty that we are blessed in so escaping.

If there is a war and we can't keep out under those circumstances, then the only other answer is to win it like we did the other one; and in order that we may do that we must be able to mobilize not merely a willing and aroused man power but an intelligent and prepared industrial power.

I DON'T know any more foolish statement than one which I have seen made recently, and I have seen it made in high places. It has become the current statement recently that America was taken into the World War by the munition makers. I am glad to have a public opportunity to testify on that subject. As you all know, I was Secretary of War. Many of you were my associates at that time in the matter of ordnance, and I ask you whether our trouble wasn't to find somebody who could make the munitions? I didn't declare the war, but from the time I came to Washington, a year before we went into the war, until it was over, I can't remember a single person who ever came to me and told me that he thought the United States ought to go into the war to give him an opportunity to make anything, from cannon to money.

I very well remember, I am sure that there must be some officers here who remember as well as I do, that when we had our Army in Mexico, it was thought that it would be desirable if we had some machine guns. I am not going into the controversy between several different types of machine guns. General Crozier came to me and said that there was one company in the United States who could make them, and he told me that he had inquired how fast they could make them, and how many they could make. He had ordered, as I recall it, eighty, and he had been told that the first delivery couldn't be made for five months, and then only two or three, and then they would trail along at two or three a month after that until we got eighty—and that was a fair sample.

Now everybody knows that the British and the French and the others had built some factories in this country and had converted some of our peace-time industry into the manufacture of munitions for them, but they were all still working for them and when we sought to have the munitions, there just wasn't anybody we could turn to to make them for us. We had to take factories and train their personnel, and we had to do the thing which General Crozier had foreseen.

The first time that I went to Congress with General Crozier after I became Secretary of War, we were trying to defend an appropriation bill. General Crozier had asked for an insignificant sum of money—I don't mean insignificant nowadays, but insignificant those days! It was insignificant by those standards. It was to buy jigs and dies and templates—are they the right words?—some sort of patterns that General Crozier thought that it would be highly desirable to have made and distributed around among the manufacturers of the country so that if he ever had to call upon them to make arms, they would have on hand the patterns and we would save the time that would be required in getting the patterns to them. So that of course it is perfectly preposterous to say that the munition makers had the slightest influence upon taking this nation—our nation—into the World War. I think that it is equally a safe assertion that the industrial preparedness which has followed in this country from the enactment of the National Defense Act, the interest which the masters of business in this country have taken in being prepared to serve their country if the call ever comes, will have no effect of a prejudicial character upon the peace ambitions of this great nation!

In other words, it is possible for you to be members of this Association and to send word to the Senate Committee that you were present in the Mayflower Hotel, on this particular occasion, when there were two ex-Secretaries of War on the platform, and that you discussed openly and without the slightest desire to conceal the facts, the problem which might some day, though you hope never, be presented to our nation, of industrial preparedness.

MR. PRESIDENT, as a medalist of this Society, may I just say another personal word? I haven't anything more serious to say. I have tried to figure out whether as a matter of fact, in spite of the very gracious and complimentary grace which Colonel Hodges has used in presenting me, whether I did do anything when I was Secretary of War that amounted to much. I have concluded that I did. I had two shoulders and I offered them alternatively to troubled men to weep on. When the burden of the day grew too heavy for an officer and he felt that his responsibility was heavier than he could bear, he would come up and he and I

would have a shoulder and eye-lash conference, and I think maybe I was a consoling and helpful and cheering influence. I remember one of those episodes. I may have told it to you once before. If I ever did, it ought to be treasured in the Army for ever anyway.

I WAS in my office one day when General Gorgas came in. He had the saddest and most harassed look I have ever seen, and as he sank rather wearily into a chair, you know what a simple and what a very great person Gorgas was, he said, "Mr. Secretary, I have lost every friend I had in the medical profession of America."

I said, "Oh, good gracious, what have you done?"

He said, "Mr. Secretary, when we first went into the war, I realized that I would have to expand the Medical Corps, and so I wrote to all my friends, the great surgeons and the doctors of America, and said, 'send me your first under study,' and they did. I made them lieutenant-colonels and majors. And then as the size of our undertaking grew, and I had further to expand the Medical Corps, I wrote to those same men and said, 'send me your second string men,' and they did. They all came and I made them captains, and first lieutenants and now this has grown so huge that I can no longer get along without the very head men themselves, and I have sent for them, and they are all here, and I have nothing to make them but second lieutenants.' "

Well, I tried to console him and I said, "Of course, that means a very great deal to you military men, and I sympathize with your views about that, but after all these great doctors, Dr. Mayo and Dr. Crile, they won't know whether one is higher than the other. They are interested only in curing the sick and saving the wounded, you are overestimating their grief about it," but it didn't console him at all.

He said, "No, you little understand human nature if that is the way you feel about it." Then he looked solemn and wanted to illustrate it to me and teach my innocence and he said, "You can never tell about men. You see a man who isn't troubled by the little annoyances of life, and you expect him to be your main reliance upon a great occasion, and he disappoints you. You see somebody else who doesn't seem to be able to buffet away the little annoyances of life and you don't tell him much, but when the real cause comes, he just rises up."

He said, "Take me, for instance. When Mrs. Gorgas and I were about to be married, we had been sweethearts for a long time and all of our friends were very happy about it and they gave us parties and we were at an army post, and they had dances and all of the kind of celebrations that usually went on. And the night before the wedding we had a full dress rehearsal and everything went off beautifully. But the next day, when I stood up in front of that preacher and he looked me solemnly in the face and said, 'William, dost thou take this woman to be thy wedded wife for better or for worse, until death do you part?' "

He said, "Would you believe it, I looked him stupidly in the face and said, 'repeat that question please?' "

So, gentlemen, I think that you will understand why the memory of my Army association is so priceless to me. I saw the members of our great Army in their hours of strain and trial. I saw them in their hours of perplexity and was privileged to be their friend and their confidant.

After it was all over and I went back to my profession, and that whole thing seemed to be another life that I had lived on some other planet, it was not unnatural that the chief glorious memories of my life are those which associate me with the Army, with the men who made it, and the men who were so successful and loyal in the job that they had to do and at the same time received a civilian chief with so much consideration and kindness and attention.

155-MM. GUN IN ACTION, ORDNANCE DAY, ABERDEEN PROVING GROUND, 1935.

Origins of Our Modern Guns

The Transition from Iron to Steel

By Col. Rogers Birnie*

THE facts upon which the award of this medal is based are not, as in the case of the two distinguished medalists who have preceded me, directly connected with the World War, but with a much earlier period. They go back to the decade 1880-1890 when there was introduced into our land service a system of construction for all guns above 3-inch caliber which proved to be safe and reliable. The principles and formulas upon which that construction was based have not been improved upon during the forty or more years that have since elapsed and they remain in practice today. So we can be proud to note that when the World War came on, although woefully lacking in quantity for the field and siege service, we were not at a loss for design and were well supplied with guns in the seacoast fortifications and such as could be used in railway mounting on land. And so also our gun designs of the 1880s, much improved it is true for range and convenience of handling and mounting, as called for by more modern requirements, remained an imminent factor in the World War.

The Army Ordnance Association owes its parentage to the World War and its mission is to promote and insure a requisite equipment of ordnance stores and supplies to our Army in case of another war—in effect, to keep the means of supply available and ready to expand to needed requirements at any time. I know of no greater responsibility to a citizen of this country than this to which you have generously committed yourselves and have, as the records show, faithfully carried out. No better example can be shown than that of your President, General Crowell, who as Assistant Secretary of War when he occupied that office, labored so wisely and earnestly to originate and perfect the plan. Your membership is made up of manufacturers, the officers of Ordnance and the inspectors of Ordnance who carried forward the work of preparation and supply of ordance equipment in the Great War, who experienced the difficulties of that time when the country was wholly unprepared for the conflict, and none can better realize the situation than these.

I was retired from active service by reason of age in 1915 and helped to organize *de novo* the International Arms and Fuze Company of Bloomfield, N. J., and Montreal, Canada. The position was tendered to me by Mr. Rufus Patterson, a leader of the business men who proposed to organize the company, within a few days after my retirement. I remained on the work until January, 1919, after the war had ceased. I can, therefore, with full knowledge, sympathize with the endeavor to keep alive and ready for future action the accurate knowledge and facilities for manufacture acquired through that experience. It is a difficult task indeed and with God's blessing I wish you success. The alternative is painfully manifest. If this is not done we will as before be at the mercy of our next foe for lack of fighting equipment. And worse will it be if we do not have allies who will furnish supplies for the use of our manpower while the home supplies are being prepared to supplement whatever stores may be in *reserve*.

TO return to the immediate subject, the decade of the 1880s was a crucial period in our history of gun construction, when we were released from the reign of cast iron by inaugurating the manufacture in our own country of steel forgings of unsurpassed quality for guns which were manufactured and tested in that period. Moreover—and in view of the then existing circumstances which made the action of the greatest importance—our law makers in Congress before the end of this period came freely to appropriating the money needed for the manufacture of the guns in quantity. I was fortunate to be detailed as inspector of ordnance at the West Point Foundry in 1880 as assistant to Lieut. C. W. Whipple. His change of station in 1881 left me in charge of the office. From the period of the Civil War this private establishment and the South Boston Iron Works were the favorite recipients of Government contracts and orders for ordnance work outside of the arsenals. This included gun construction because of their equipment (as compared with the arsenals) and the number of skilled workmen, particularly on the larger lathes for boring and turning in their shops. When the gun factory was first established at Watervliet Arsenal some years later Colonel Parker was glad to secure the services of some of the West Point Foundry workmen to inculcate the art amongst the untrained men. I stood as an interested observer in the foundry shops watching one of these workmen turning a shrinkage surface some 26-inches in diameter for the assemblage of an outer layer. The means he used to determine when the exact required diameter was reached comprised a simple horseshoe caliper set to size for hand use and a bit of newspaper, actually the *New York Sun*, which could be counted upon from day to day to be .003-inch thick. He would be careful not to take off too much metal and when submitted for inspection and measurement afterward with the ordnance vernier calipers the diameters were seldom found to vary from prescribed more than the plus or minus .001-inch allowed. To my uninformed mind in these early days it was miraculous that such skill and judgment could be evidenced by the workmen!

When the bill appropriating money for the armament for fortifications passed the Senate in 1883, it contained, among other designated objects: making and testing two breech-loading steel guns—one 8-inch, and one 10-inch. This was an item which the Army Ordance Department had been eagerly awaiting, and which it proceeded to put into prompt execution.

The director of these activities in the Ordnance Office was Capt. Charles S. Smith, who had previously served a number of years with the Ordnance Board. This Board had stood as the principal agent of the Ordnance Department in matters relating to gun construction. The Board remained active in after years, but was never so powerful again. Capt. Smith, bright-minded, clear-headed, and most energetic,

*U. S. Army Retired. Army Ordnance Association Medalist 1935.
Editor's Note: This is an address delivered at the Seventeenth Annual Meeting of the Army Ordnance Association upon the occasion of the award of the Ordnance Medal of Merit to Colonel Birnie, The Mayflower Hotel, Washington, D. C., October 2, 1935.

after his experience with the Ordnance Board was the best informed officer on gun construction in the corps, and was placed by General Benét in charge of gun work in the Ordnance Office occupying the place of Principal Assistant. He quickly vindicated the change of policy. He visioned the approaching necessity for the manufacture of the steel built-up gun, and proceeded to disseminate available information for posting the officers of the corps in the matter of gun construction as then practiced abroad and also regarding the manufacture of steel for guns. He anticipated the time when our steel makers would be fully as well qualified to manufacture gun steel as any then existing abroad. He began publication of the *Notes on the Construction of Ordnance* in 1882. If one will examine these Notes it will be found that the first twenty-four numbers were published in 1882 and 1883, and all but one of these (No. 17) were republications from foreign sources. This was my first introduction to the works of Virgile and Clavarino. The translations of these which I made at that time were published in Nos. 10 and 19. Captain Smith also made a careful compilation of the best information regarding practices in making foreign gun steel, and a circular memorandum regarding this was published on April 3, 1883, as information to our steel makers in making the experimental steel forgings, then ordered under the Act of 1883.

Ordnance Construction Note No. 25 gives an account of the testing of the first steel hoops received by the Ordnance Department under these orders from the Midvale Steel Company. These tests were made at the West Point Foundry under my direction. They comprised two large hoops for the breech reinforce of guns, and one forged hoop of dimensions for chase reinforce. Both of the large hoops were rolled. The small one was forged by hammering.

Of the first two, one was treated by annealing, oil tempering, and again annealing; the other was simply annealed. The smaller hoop was treated in the same way as the first large hoop. The tests of these hoops comprised finishing, and assembling on cast iron cylinders of approved metal, and subsequent dismantling by cutting out the cast iron to release the hoops entirely. The first shrinkage test was made with a shrinkage calculated to develop a stress at the interior of the hoop equal to the elastic limit of the metal, as shown by the test of free specimens. The test was then repeated with a shrinkage double the amount of the first. It was called the strength test, for which the hoops were taken in the condition in which they remained after the first test, and gave an opportunity to judge of the elastic recovery of the whole metal after being stretched beyond the elastic limit. It will be understood that a number of free specimens were taken from each hoop to ascertain the physical properties of the steel. One of the prime objects of the test was to ascertain to what extent the physical properties, determined from the test of free specimens, could be relied upon in evaluating the proper shrinkage values. Careful measurements were taken of the hoops, both before and after each of these tests, and of their extension while in place on the cast iron cylinders. The shrinkages for the tests were carefully computed from Clavarino's formulas. The result showed that the hammered, oil-tempered, annealed hoop was slightly superior, and that the large oil-tempered hoop was better than the annealed hoop. From this, it was concluded that oil tempering with subsequent annealing was the best method of treatment. Without the subsequent annealing, the oil tempering alone would have left the metal of the hoop in a state of unequal strains. A careful comparison of the final results with those to be anticipated from the application of the formulas showed admirable agreement. As a final conclusion, it was determined that physical properties of metal shown by the tests of free specimens could be relied upon to calculate the proper shrinkages; except, that there should be allowed a reduction of about 10 per cent in elastic limit of an outer hoop in computing the shrinkages. Observations were made in connection with the test to determine the amount of extra metal which was to be left on the hoops when received from the steel makers, the amount of heat required for expanding the hoops for assembly, and other practical matters relating to the operation. The above tests were completed in January 1884.

THE next step in the program of tests comprised the building up of a section about 8 inches long, taken through the reinforce of the 8-inch B. L. steel rifle. The design of this rifle was prepared in the Ordnance Office under the direction of Captain Smith, and it may be here remarked that he was responsible for the designs of our new guns. The trial of this section was designed as preliminary to the making of the gun itself. The section comprised a portion of the tube, a portion of the jacket, and two hoops superimposed and shrunk together exactly as they would be in the gun. As our steel makers were not then prepared to furnish the larger forgings, the tube and jacket forgings were ordered from the Whitworth Company of England. All hoops and the breech block forging for the gun were ordered from the Midvale Steel Company. The Whitworth Company, at the same time, furnished separate forgings for the tube and jacket pieces of the experimental section. The tests of free specimens which were made of all the pieces when received were not satisfactory for the tube and jacket forgings, and these pieces were rejected. They were replaced by another delivery made some months later, but the shorter forgings for the tube and jacket were considered satisfactory, and were used in the experimental gun section. My report on the assembling and dismantling of the experimental compound gun cylinder (section) was published in *Notes on the Construction of Ordnance* No. 32., to which I respectfully commend those who may wish to go into all the details.

In conducting the test every effort was made to gain practical information for manufacture of the gun in regard primarily to computation of all the shrinkages and the displacements to be expected under the shrinkages, the heating of the parts, and their assembly, etc. The results of the test were satisfactory. It was found finally, as before, that the test of free specimens was satisfactory for calculating the shrinkages; that the metal of the tube was improved by being subjected to pressure in the completed structure; that the metal of the jacket was also improved, and that the metal of the outer hoop was slightly deteriorated after test. This latter confirmed the result from the hoop tests that the elastic properties of the hoop were slightly diminished over those shown by free specimens, so that the rule was adopted thereafter to compute shrinkages with the elastic limit of the hoop as determined by free tests reduced by 10 per cent. The result of this test left us in a position to proceed with confidence in the manufacture of a gun. The replacing forgings for the tube and jacket were received from Whitworth and tested with satisfactory results, and the gun was built and completed at the West Point Foundry in June, 1886. My report on the construction of this gun is contained

in the report of the Chief of Ordnance for 1886, page 229.

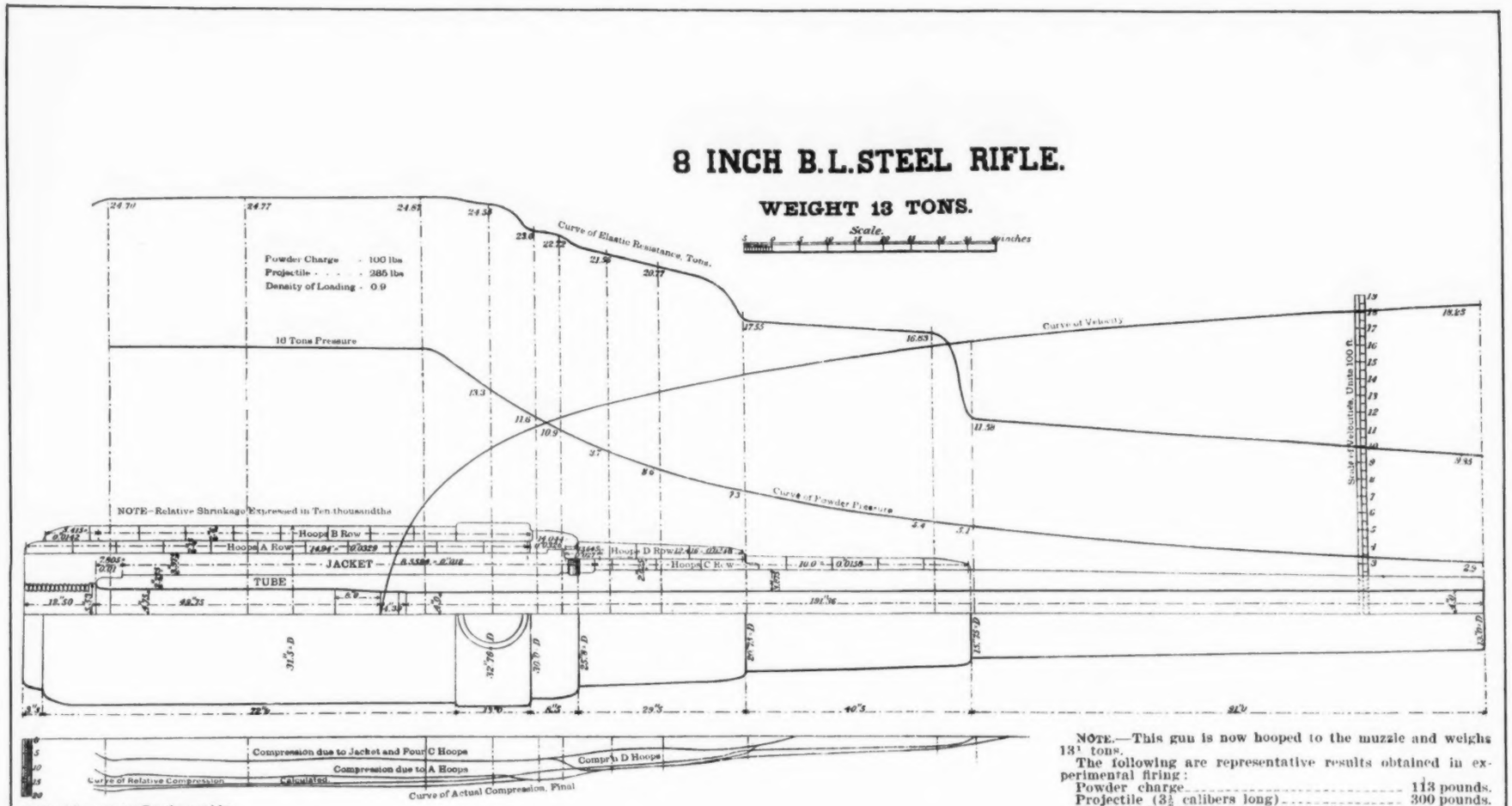
An interesting fact was developed in regard to this gun. When the gun was building, the question was debated as to whether the muzzle end of the gun should be hooped or left with the tube alone to support the stresses in firing. At that time it was decided to leave the tube uncovered. The gun was fired 77 rounds, and it was found that the muzzle end of the tube was yielding. The gun was sent back to the foundry to be hooped to the muzzle. In turning off the exterior of the tube over the part that had not been previously hooped, the bore of the tube contracted in diameter due to the removal of the outer metal. This was conclusive proof that in the original treatment of the metal the strains on the exterior of the forging had not been completely removed by the last annealing, since this expansion of the tube showed compression of the outer fibers of the tube. The gun was now rendered entirely satisfactory.

THE test of the experimental gun section gave scope for a critical elucidation of the accuracy of the shrinkage formulas. Virgile's methods were in vogue in France. Clavarino, a professor in an Italian school, had forcibly criticized Virgile's formulas. The essential difference was this: Virgile estimated the strength of the gun upon the assumption that the elastic limit under extension of no one of the cylinders should be exceeded when the interior pressure of firing was applied. This led Clavarino to deduce formulas based upon the assumption that none of the fibers of metal in any of the cylinders in the gun should be stretched beyond the elastic limit either in extension or *compression*. It appeared to me that Clavarino was right, and that his formulas should be used rather than Virgile's. Moreover, in the ordinary application the anticipated dispacements of metal in the various parts, as calculated from the formulas, would be readily compared with the observed changes measured in the experimental work. I found Clavarino's deductions essentially correct in all that pertained to the matter, except as to changes of length. In the experimental gun cylinder I observed that the displacements in length, as deduced from Clavarino's formulas, were not correct. They gave in every case a contrary sign from the actual; that is, they indicated a contraction where there was an extension, and an extension where there was an actual contraction. For the remaining set of theoretical values determined from his theories as modified by neglecting the supposition that a longitudinal force was acting, the comparisons with the actual changes in length show probably as exact a coincidence as could be expected from the experiments. The omission of the factor embodying the longitudinal stress has, however, little effect on the diametrical changes of dimensions. Thus, it came about that in publishing my complete paper titled "The Resistance of Built-up Guns and the Shrinkages Adapted to Their Construction" (*Construction Note* No. 35), I adopted Clavarino's limitation imposing the condition that none of the fibers of steel in a structure shall be displaced, that is, either extended or compressed, at any time either at rest or in action beyond the elastic limit of the metal. I omitted his theoretical assumption that a longitudinal stress was exerted upon each cylinder both at rest and in action as though the cylinder were closed at both ends with interior and exterior pressures applied. Resulting formulas must evidently be true for the state of rest. The actual longitudinal strain that is exerted when the gun is fired by the pressure on the breech closure must, of course, be considered. This longitudinal stress is included, and its effects embodied in estimating the longitudinal strength of the gun in the published formulas.

The formulas of Note 35 were used in computing the resistance and the shrinkages for all of our guns afterwards constructed on this plan, including the 8-inch steel rifle, completed in 1886, and the 3.20-inch guns cited below.

In assembling the 8-inch rifle the compression of the bore of the tube was measured with each application of an outer layer; that is, for the application of the jacket, and each one of the two rows of hoops. The measured compressions of the bore were compared with the estimated compressions for the shrinkages. The final results showed: anticipated compression of the bore of the powder chamber 0.0129-inch, and measured actual compression 0.0131-inch; anticipated extension of the exterior diameter of the outer hoop 0.0285-inch, and actual extension 0.0276-inch. In each case a difference of less than one one-thousandth of an inch. The degree of accuracy actually obtained was 98 per cent of the figures anticipated. With such results obtained in a gun weighing 13 tons, and involving so many shrinkage surfaces, it can be seen that confidence was created, and the assurance of success to future manufacture of the same kind. (See plate showing graph and computed data on page 150). This substantiated the claim that the production of a proper degree of tensions in a built-up gun is a certain process which, after the plans of the gun are made, requires only competent workmen, good machining, and requisite care in inspection to effect its accomplishment. Lieutenant Howard's report (Appendix—Report of Chief of Ordnance, 1887), upon the construction of a number of 3.20-inch field guns at the West Point Foundry, following the construction of the 8-inch gun, shows, by the coincidence between the anticipated and the actual tensions obtained in these guns, that the construction is not only practical but its results are sure. It will be observed that these guns contained only one shrinkage surface. A single shrinkage surface makes the anticipated result more difficut of accomplishment, because, if there be two or more such surfaces, any error, other than that which may occur from carelessness on the part of the workman and inspector, due to finishing the work for preceding surface can be corrected in the next shrinkage applied. In subsequent construction of the built-up guns at the Watervliet factory, and elsewhere, the practical agreement of actual results with those anticipated from the calculations was universal.

CONTINUING the test to standardize and acquire the most accurate knowledge possible of this type of gun construction, experiments were made to determine the effect of a high heat upon oil-tempered gun steel exposed to its action for a short time. These tests showed in one case that the physical properties of the short section of an 8-inch gun tube were not materially affected by pouring a quantity of molten iron into the mold surrounding the steel piece and leaving the iron in contact with the outside of the steel for 3-5/10 minutes. In another case, the quality of the metal in a short cylinder of Whitworth gun steel was not injured by the white heat of a furnace applied for a sufficient length of time to raise a part of the outer surface of the piece to a dull red heat. In this instance, the steel cylinder was shrunk upon a core—one end and the outer surface only being exposed to the heat. The utility of these experiments is found in the necessity which sometimes arises to remove a hoop


8 INCH B.L.STEEL RIFLE.
WEIGHT 13 TONS.
Scale.
Curve of Elastic Resistance, Tons.
Powder Charge - 100 lbs
Projectile - - - - 285 lbs
Density of Loading - 0.9
10 Tons Pressure
Curve of Velocity
Curve of Powder Pressure
Scale of Velocities, Units 100 ft.
NOTE—Relative Shrinkage Expressed in Ten-thousandths
Hoops B Row
Hoops A Row
JACKET
TUBE
Hoops D Row
Hoops C Row
Compression due to Jacket and Four C Hoops
Compression due to A Hoops
Compr'n D Hoops
Curve of Relative Compression, Calculated.
Curve of Actual Compression, Final
Scale of Compression Ten-thousandths.
Vertical Scale for Compression per inch of Diameter of Bore Exaggerated 1000 Times.

NOTE.—This gun is now hooped to the muzzle and weighs 13¹ tons.

The following are representative results obtained in experimental firing:

Powder charge	113 pounds.
Projectile (3½ calibers long)	300 pounds.
Density of loading	1 (unity).
Muzzle velocity	1, 852 feet per second.
Muzzle energy	7, 133 foot-tons.
Pressure	36, 000 pounds (16 tons).

Gun Making in the United States.

GRAPH SHOWING THE COMPUTED RESISTANCE, SHRINKAGES, COMPRESSION OF BORE, AND INTERIOR BALLISTIC CURVES OF THE FIRST 8-INCH STEEL RIFLE CONSTRUCTED FOR THE U. S. ARMY, 1886.

or other cylinder after it has been shrunk in place; indeed the whole gun can be dismantled in this way if necessary. The pieces thus removed can be used again, as it is known that the quality of the metal is not affected when the operation is skillfully performed.

The experiments to determine the amount of frictional resistance to the sliding of one cylinder over another when shrunk together in the usual way were made to determine what would be the aggregate hold of the jacket shrunk upon the tube in a gun, due to this source of resistance alone; that is, to determine what resistance the friction between the two surfaces would offer to any longitudinal displacement of the jacket. In the 8-inch gun four radial pins were put in near the muzzle end of the jacket offering an aggregate resistance of about 1,131,300 pounds to shearing; this being only one-third of a total force which would be exerted to slide the tube through the jacket longitudinally for a pressure of 45,000 lbs. per square inch in the bore and acting on the breech block. Several hoops, three and four inches in width, were carefully prepared and shrunk upon a piece of gun tube. The pressure which each exerted on the tube was determined by the usual formulas and noting the effect of the shrinkage. These hoops were pushed off in the testing machine at Watertown Arsenal. From the force required to start and keep these hoops moving under pressure, it was found that the frictional resistance somewhat exceeds 15 per cent of the normal pressure at the contact surface of the two steel cylinders shrunk together as in gun construction. In the 8-inch gun the least pressure at any time (i. e., in the state of rest) existing at the contact surface between the tube and jacket is 7.17 tons per square inch, making the aggregate normal pressure for the whole contact surface about 62,785,000 pounds. Taking only 10 per cent of this, we have over six million pounds resistance to sliding due to the friction alone. As the force tending to separate the pieces by sliding, when the gun is fired, is scarcely more than one-half of this it was readily concluded that the resistance to longitudinal separation of the parts of the gun was amply provided for, the pins being in the nature of security only against any start taking place.

It had been asserted by some that annealing after oil-tempering would remove the beneficial effect of the oil tempering. To investigate this, parts of three 3.20-inch gun tubes were sent by Lieut. F. E. Hobbs to Watertown Arsenal from the Midvale Steel Company; two pieces were left in the condition as used in the guns, and one was re-oil-tempered, to represent the condition which would be left by oil tempering without subsequent annealing. The result of this test (*Notes on Construction of Ordnance* No. 41) showed for the last named one that the entire surface metal—exterior, bore and ends—was in a state of compression, while the interior of the mass was in a state of tension. The two pieces of gun tube as used showed none of this and gave admirable physical tests. Indeed, the beneficial effect of oil tempering with subsequent annealing had been demonstrated by numerous tests made with steel of home manufacture. This question has been pretty thoroughly treated in the discussion before the Naval Institute in January 1888 (*Proceedings of the United States Naval Institute*—"Steel for Heavy Guns"—No. 40, page 62). One other test preliminary to construction may be noted, to wit: that of a forged trunnion hoop with the trunnions complete. This, in order to determine if a forging of such irregular form could be made satisfactory for use in the outer layer of a gun or mortar, to perform the double function of doing its part in the tangential strength of the construction, and also support the piece on its carriage. The manufacture of this hoop at the Midvale Steel works is described by Lieutenant Hobbs, and the subsequent shrinkage tests at the West Point Foundry under my direction, are all reported in *Notes on Construction of Ordnance* No. 39. The thorough test to which the hoop was submitted, both for free specimens and in shrinkage, did disclose some relative weakness in the trunnion masses, but satisfied the Department that the Midvale Steel Company was capable of manufacturing these hoops as required.

AFTER the manufacture of the 8-inch steel rifle at the West Point Foundry, and the various supplementary tests to which I have alluded, I was ordered to duty in the Office of the Chief of Ordnance in Washington, D. C., as assistant to Captain Smith.

Here we were shortly called upon to meet the objections of the Congress in endeavoring to secure legislation to make the built-up steel gun the standard pattern for future construction in the Army. This legislation was fortunately secured in the bill appropriating funds for armament for fortifications, which was enacted in the year 1888. I would like here to recapitulate the existing situation in regard to this legislation, which necessitates a sketch of our progress in gun making since the Civil War. We ended the Civil War with the Rodman smooth-bore cast iron guns firmly established as patterns. These, it will be recalled were made with initial tension. In 1851 Rodman became familiar with Barlow's law, enunciated a few years previously, relating to the action of a central force. Rodman fully appreciated this law, and stated very clearly "The object of my improvement was in part—if not fully—attained, to wit: throw the gun upon a strain such that each one of the indefinitely thin cylinders composing the thickness of the wall of the gun should be brought to the breaking strain *at the same instant.*" The plan adopted was to cool the casting from the interior, while keeping the outside hot until the cooling was complete. The difficulty of producing a perfect degree of tension by this method was very great; it was impossible to apply this to effect a perfect state of initial tension, but a good degree of success was obtained. The introduction of rifled ordnance, which came about at the time of the Crimean War, was appreciated by Rodman, who undertook to apply his method of manufacture to rifle cast iron guns in 1861. Seven muzzle-loading cast iron rifles, namely: three 8-inch, one 10-inch, and three 12-inch were made between 1861 and 1869. Out of six of these guns—two 8-inch, and one 12-inch gave a good record for endurance in firing; the remaining three were not satisfactory, so the construction was suspended in 1871. At this time it could be concluded that cast iron rifles were not suitable for firing the heavier charges which came to be gradually an increasing necessity in making modern guns; however, the question of cast iron was revived in later years, and even in the year 1888, which we have now reached, was advocated by some very energetic people and viewed with much compassion by Congress.

The next ten years, from 1872 to 1881, were devoted to carrying out the recommendations made by the so-called Heavy Gun Board of 1872. This Board recommended for trial—(a) *three types of muzzle loading guns:* 1. The Woodridge wire-wound; 2. Alonzo Hitchcock's wrought iron gun (to be made by welding together discs or cheeses of

wrought iron to make a solid wrought iron piece); 3. Conversion of our cast iron guns (to be lined with wrought iron or steel tubes); (b) *four types of breech loading guns;* 1. Fredrick Krupp; 2. E. A. Sutcliffe; 3. Nathan Thompson; 4. French and Swedish system; and (c) *and two miscellaneous:* 1. H. F. Mann, and 2. Lyman multi-charge. The only successful issue of the period was the Ordnance system of converted muzzle-loaded rifles, made by lining 10-inch and 15-inch Rodman smooth-bore guns with wrought iron tubes in the beginning, and eventually with steel tubes. The wrought iron tubes were made from the purest wrought iron bars obtainable, at first from the Armstrong Company in England; but the Ulster Iron Works at Saugerties, N. Y., were shortly able to furnish the best material.

The steel tubes were introduced when the making of steel forgings for guns became of such primary importance in 1880, and an order for 50 of these tubes was beneficial in enabling the Midvale Steel Company to improve its manufacture of gun steel.

THE breech-loading guns tried under the recommendation of the Board were less successful. Krupp refused to furnish a gun unless promised an order for a number of them in case of satisfactory test. So, his gun was not tried. Our constructors decided to test his system by converting cast iron smooth-bore guns into breech-loading rifles with the Krupp fermeture. A 10-inch smooth-bore Rodman gun was taken to make an 8-inch breech-loading rifle by cutting off the breech and boring out the casing to receive a steel jacketed tube patterned after the Krupp plan. A 15-inch smooth-bore was likewise converted into an 11-inch breech-loading rifle. The first 8-inch gun was made and tried. The steel tube and jacket forgings for this were furnished by Whitworth, and were of good quality. The proof of this gun was successful. It withstood 636 rounds, using the same charge as in the muzzle-loading rifle, and remained in serviceable condition. Encouraged by this success, another 8-inch and an 11-inch were then ordered and tested, but the work was suspended when these failed under the proof to which they were subjected. These guns were designed to use a relatively heavier charge than the first 8-inch. Both guns failed after a few proof rounds by clear fracture of the steel jacket piece in a plane through the front angles of the slot for the breech block. It may be remarked that in these guns the angles at the front corners of the slot were cut square, a feature which is stated to have caused the few disasters in the guns made by Krupp, but the fractures and the test of the steel which ruptured in these guns showed a quality of steel badly adapted to gun structure. This steel was procured from abroad. These trials resulted in a condemnation of the Krupp breech mechanism after an admittedly unfair trial with respect to the merits of the mechanism itself. The effect of the failure of these guns, however, in producing an unfavorable opinion of steel in gun construction was most marked. Not only was this opinion generally diffused, but it was taken up by officers of our own service and others interested in the science of gun construction. So, it was up-hill work with this metal for some years afterwards to convince such doubters that there was taking place a vast improvement in quality gained by knowledge and experience in its manufacture.

More or less partial trials of the remaining systems recommended by the Board of 1872 resulted unsatisfactorily. No trial was made of the French and Swedish system at this time. A trial of the Lyman multi-charge gun was made in later years, when Mr. Haskell appeared as its fervid advocate. During the same period several field guns were tested at the Sandy Hook Proving Ground, including the Dean 3.5-inch mandreled bronze gun; a 3-inch B. L. rifle with Sutcliffe mechanism, and another of the same caliber with Moffatt breech mechanism; also a converted B. L. chambered rifle made from our 3-inch wrought iron muzzle-loading rifle by using a steel jacket and breech block of Krupp design and a Broadwell ring for gas check. Of these, none was afterwards made for service, except a few of the Krupp conversion.

FOR several years preceding my arrival in Washington in 1886, the course of legislation in Congress which governed these matters, had been such as to leave all questions of policy in a state of the greatest uncertainty. Beginning with the appointment of the Getty Board in 1881 every year thereafter, except 1882, when the report of that Board was under consideration in Congress, had been marked by the appointment of a new Board pursuant to Act of Congress; until finally, the subject of boards had reached at least temporary exhaustion when the report of the Fortifications Board was brought out in 1886. In that year, and in 1887, there was no new board designated, neither was there any Fortification Bill passed. The Ordnance Department was placed in sore straits, having no money even to pay the employees at the Sandy Hook Proving Ground.

The Ordnance Department had wisely occupied the years from 1883 to 1886 in perfecting its plans for the manufacture of built-up steel guns, the trial of which had been authorized in 1883, as previously mentioned, and it was now prepared to advocate this system of gun construction with every degree of confidence. Opposition to the recommendations of the department had been continuously urged before the appropriation committees of Congress, and a goodly number of the members of Congress were satisfied to accept these opposing views as worthy of consideration at least. In 1887 I was called upon to read a paper on gun-making in the United States under the auspices of the Military Service Institution at Governors Island, which contains, as I believe, a very fair and accurate account of the many vicissitudes of gun making in the United States, from the time of the Civil War. This is a source from which I have largely drawn the details heretofore given.

I must, however, refer to the 12-inch breech-loading mortars, examples of composite construction of iron and steel advocated by the Ordnance Department for pieces of low power which were introduced later.

IT was charged in Congress that the Ordnance Department had spent millions of dollars and had nothing to show for it. This was easily refuted by showing that the annual appropriations from Congress under control of the Ordnance Department from 1866 to 1886 had scarcely exceeded one million dollars, and with this we had procured one 20-inch and twenty-six 15-inch Rodman smooth-bore guns; two hundred and ten 8-inch converted muzzle-loading rifles; one 8-inch breech-loading rifle; a number of field pieces, beside several experimental guns which were still serviceable. A part of this fund was expended in plans for constructing the Hitchcock gun at Springfield Armory and the Woodridge wire-wound gun at Frankford Arsenal.

The opposition in Congress was represented by the lingering exponents of cast-iron rifles; of those advocating composite construction of cast iron and steel for large guns; by earnest exponents of cast steel rifles, and some disappointed inventors of rejected systems. Discussion was rife throughout the country on the subject, and a number of public addresses were delivered, in several of which I had the honor to take part. The issue was settled in Congress when the Fortifications Bill was passed in 1888, wherein the built-up steel gun was recognized by Congress and money freely appropriated for its construction by the Army for seacoast fortifications.

During the discussion in Congress the younger officers of the Ordnance Department were frequently called upon to give testimony, and appeared rather often at the Capitol. In the Senate Chamber, Senator Hawley had two of us posted in the north corridor beside the door near which he sat in the Chamber. He wished to have us near at hand to help him in any technical questions that might arise in the debate then in progress. This was very annoying to Senator Gorman, who spoke sharply of "this invasion of the halls of Congress by officers of the Army". In the House, Mr. Burns, of Missouri, observing one of our officers dressed in shirt-waist one hot day alluded scathingly to the "popinjays of the Ordnance Department to be seen in our midst". Mr. Randall was at first a consistent opponent of the appropriation asked, but he was exceedingly polite to us and finally voted right. He was an ardent protectionist, and I believe, recognized the value of the prospective increase in steel manufacture, and improvement in steel production, by approving the manufacture of the steel rifles.

I AM tempted here to quote an extract from the letter written to me by Major General William Crozier, who was Chief of Ordnance when I retired from active service. This letter gave me a somewhat more exalted view than I had held before of my assistance in procuring the favorable legislation in Congress, as I had always looked upon it as simply a duty performed in company with other young officers:

"The gun is the fundamental feature of the artillery arm, with which its contests are lost or won. Your service in the improvement of its construction is well known and has been recognized throughout the world. Not so well known is your work in aiding and inducing Congress to build any kind of a gun, or anything else, for the defense of the seacoast of the country, after the long period of neglect of these defenses following the Civil War. During the 70s and 80s of the last century all well informed people who had taken the trouble to give the subject thought knew that the coast defenses of the country had lapsed into a state of practical uselessness, and that this line of defense was in urgent need of restoration. The matter had received some attention, or rather attention to it had been shouldered off, by the creation of various boards to consider its related subjects. The senior officers of the service will recall the Getty Board, the Senate Committee on Ordnance and War Ships, the Gun Foundry Board, and the Fortification Board commonly known as the Endicott Board. The last named Board made its report in 1886, but no action was then taken upon it, and no fortification bill was even introduced in Congress during that year or the one following; so that the meager appropriations which had been available for the experimental work came to an end; and there was nothing. Under these circumstances the Ordnance Department undertook to secure through some other means than the fortification bill, funds for the prosecution of such work as was necessary to prevent the art of ordnance design and construction from falling completely to disuse in the United States, and to this end urged an appropriation of $500,000 as an amendment to the Army Bill, when this bill was under discussion in the House of Representatives in the spring and summer of 1888. It was a fact that at this time there was in Congress a willing but not greatly interested majority in favor of doing something for the coast defenses of the country, but there was also a determined opposition, and the difficulty was to get the matter to a vote. The method of amendment to the Army Bill failed in the House of Representatives; as the amendment was ruled out, without vote, upon a point of order. The effort was, however, renewed in the Senate, and there, by skillful use of the rules, a vote upon it was secured; and not only that, but another amendment, which carried a very considerable appropriation for commencing actual work on the coast defenses was also attached to the bill. The Appropriations Committee of the House, which had not theretofore intended to report a fortification bill, then hastily prepared such a bill covering substantially the same objects as the two amendments to the Army Bill, and reported it for passage by the House in substitution for the appropriate items of the latter bill. The final outcome was that the fortification bill became law and the rehabilitation of the coast defenses was commenced by its approval on September 22, 1888. In this work, which was led by the then Capt. Charles S. Smith, principal assistant in the Ordnance Office, you bore a laborious part, working day and night, in preparing reports and memoranda, in meeting attacks of interested parties upon the proposed schemes of ordnance construction, and urging upon members of Congress the views which were subsequently adopted, to the great advantage of the country; in which your character, attainments, and sincerity were a useful influence which it would be hard to estimate."

In concluding, I wish to extend my grateful thanks to the members of the Army Ordnance Association for the bestowal of this medal which I regard highly. I feel that it forms a fitting climax to my service in the Ordnance Department.

Our Lines of Defense

The Approach to an Honorable Maintenance of Peace

By Ralph E. Flanders*

WE are gathered here, as citizens of a peace-loving country, to discuss the improvement of design and construction of the matériel of our national army. There need be and is no conflict between our preparations for peace and our preparations for the event of war, when both are pursued with equal intelligence and energy. To neither of them have we as yet given our best effort.

The honorable avoidance of war demands something more than the application of policies hastily devised in the face of a conflict visibly approaching. It demands of the nation that its foreign relations, year in and year out, shall be such as to invite confidence in our good will, in the steadfastness of our purposes, and in the strength of our defense.

We must begin by learning to be "good neighbors" to the rest of the world, as our Chief Executive has phrased it. It is well to remember some of the qualities of real good neighborliness. Good neighbors are not self-righteous, are not voluble in their criticism of the internal arrangements of adjoining householders. They are willing to help without being officious. In the past we have not always been perfect in our international manners, though our discretion is growing with experience.

We are fortunately placed for the avoidance of justifiable suspicion and offense. We are more nearly self-contained than any other of the great powers. We have plenty of room for a population double our present size. These two facts relieve us of problems which oppress other nations more severely than we can possibly realize. They should make us charitable in our judgments, without bringing weakness to our policies.

We have no need for land, and we have not the same need for international markets. We have the greatest home marked in the world, capable of indefinite expansion. In saying this I do not at all mean to imply that by preference we will minimize our commercial relations with other nations. Both we and they will profit by interchange. What is implied is that foreign markets are not the life-and-death problem for us that they are for others.

We are then building up this first line of defense of mighty intangible forces: international neighborliness, good manners, and an evident freedom from the necessity for new territory or exclusive foreign markets. This is the first and greatest preparedness. But material preparedness, in the world in which we find ourselves, can be neglected only at the cost of loss of respect and of useful influence in the councils of the nations, and at the final cost of attack unprovoked except by our helplessness. If the intangible defenses are wisely planned and securely executed, the material defenses need not be extended and burdensome. Our present military establishment is neither.

There is at this point a moral confusion in the minds of many. This confusion leads toward action which in the end verges on treason. Wise public policy plans the intangible and the tangible defenses with respect to each other. Thus the magnitude of the military establishment is set. With that magnitude once established we can not compromise on the quality and effectiveness of the military army. Both must be the highest to which our resources, skill and devotion can attain. When on the contrary, endeavor is made by indirect legislation, by propaganda, or otherwise, to limit our military strength by decreasing its efficiency, then we cross the line from sound determination of policy into the region of falsehood and treason.

WE are met here tonight as members of the Army Ordnance Association to consult on the increase of the effectiveness of the military establishment of this nation. We are engaged in a necessary and useful work. It is one wherein, if we have prepared our intangible defenses, we need have no doubting thoughts as to the rightness of our course.

Besides appearing as a member of the Association, I stand before you in two additional and related capacities.

As President of the American Society of Mechanical Engineers I herewith renew the declaration of policy made to the Secretary of War more than a year ago. It is a part of our Society program (1) to give place in our meetings to papers and discussions relating to the technique of production of non-commercial munitions; (2) to organize such advisory committees as the Army or the Navy may request; and (3) to assist in solving the problem of technical personnel. For these purposes we are at your service.

The other capacity in which I appear is that of a manufacturer of machine tools—the ultimate source of all modern war equipment. As such I represent a class which is popularly supposed to foment war and to profit from it. As to this there are two things to be said. The first is this: No intelligent man believes that there is any enduring material profit in war. The full weight of human experience is at one with human aspiration in seeking its abolition. The second is this: If any way can be devised which will remove the profit from the production of war material (whether of food, clothing, equipment or ammunition) which will not be an actual deterrent of that production and which will not act to hamper the prosecution of a conflict as much as do the operations of the enemy, such policies will be welcomed and cheerfully accepted. The problems we are considering are too serious to be decided on the basis of private profit.

A BROCHURE containing reprints of the preceding articles, viz. "Organization for Defense" by Brig. Gen. Benedict Crowell, "The Art of Victory" by Mr. Bernard M. Baruch, "Peace, War and Munitions" by Mr. Newton D. Baker, "Origins of Our Modern Guns" by Col. Rogers Birnie, and "Our Lines of Defense" by Mr. Ralph E. Flanders, has been prepared and will be furnished, without charge, upon request. Members are asked to distribute the brochure to everyone who should be interested in our national defense.—Editor.

*President, American Society of Mechanical Engineers.
Editor's Note: This is an address prepared for delivery at the Seventeenth Annual Meeting of the Army Ordnance Association in which the American Society of Mechanical Engineers participated. The Mayflower Hotel, Washington, D. C., October 2, 1935.

Keeping the Record Straight

General Crozier Still an Expert in Ordnance and Fact

DURING recent months Maj. Gen. William Crozier, U. S. Army, retired, distinguished Chief of Ordnance from 1901 to 1918, again took his facile pen in hand to state the truth regarding American ordnance administration during the World War. Beloved and admired these many years for his great leadership of the ordnance cause, his genuis as an armament engineer and his ability as an administrator, General Crozier in far off Peiping, China, seventeen years after he officially completed his great work, manned his guns and fired them in the interest of ordnance truth. ARMY ORDNANCE considers the incident so unique that it publishes below, with General Crozier's permission, the public correspondence which appeared in the *Peiping Chronicle* during August, 1935. The record speaks volumes as to the typically flimsy attack which is being made in so many quarters here and abroad on America's World War achievement and the need for constant vigilance and action on the part of those who know the truth. The incident in full is as follows:

IN its issue of August 17, 1935, the *Peiping Chronicle* contained the following article, which was reprinted from the *London Economist,* under the title "Bull's-Eyes: A War Time Tragedy":

"Incidents sometimes come to light which illustrate in a vivid and disconcerting manner the lack of imagination and elasticity of the 'expert' when faced with a new and unexpected situation; and Mr. Lloyd George's memoirs showed that these defects are particularly in evidence in time of war. One of the most striking examples of this woodenness of the official mind was the notorious episode of the British rifle orders placed in the United States. In the winter of 1914-15 the British War Office was hard put to it to find rifles for the newly recruited armies, and under pressure from certain members of the Cabinet orders for British calibre rifles were placed with the Winchester and Remington firms of America, which were ultimately increased to no less than 3½ million rifles. In their enthusiasm, the contractors promised that deliveries would commence in the autumn of 1915, and set to work to build factories and housing accommodation for the large staff needed to cope with these colossal orders. But, alas, like so many other contractors, they failed in their promises, and deliveries in bulk did not start until the winter of 1916. Fortunately for the British troops, the wastage of rifles in trench warfare proved negligible, and the Kitchener armies were finally equipped, after some delay from the output of two British factories. By Christmas, 1916, however, the American rifles were arriving in large numbers, and in February, 1917, the American factories were probably producing more rifles per week than any factories had ever turned out in the world's history. As, however, the rifles were slightly different in type, though of the same bore as the British Service rifle, they were not sent to France, but were issued by our War Office to home defense troops, stations overseas, etc.

"At about that moment America abandoned her neutrality and entered the war. And with the object of coördinating American and European war activities, the Balfour Mission landed in the United States in mid-April, 1917, almost on the very day when a law was rushed through Congress conscripting the young manhood of America. One of the many important suggestions that the Mission brought to Washington was that the American Government should take over the colossal new factories, continue production, and equip the new recruits with rifles without keeping them waiting for weeks or months as had been necessary in Great Britain. America bought the factories; but the head of the Ordnance Department was unfortunately a technician keenly interested in a new American rifle, which he claimed to be the best in the world. This Springfield rifle had a calibre of .300-inch against the British .303. The Mission urged that the British rifle had, in fact, fulfilled all practical requirements in the field, that it would carry a bayonet and that it would shoot straight and effectively enough at the ranges and in the conditions for which it was in practice used. It was, in fact, an excellent campaigner, whatever its merits at the shooting butts might be. Clearly, moreover, it would be a great advantage for the American troops in the field to be able to draw small arms ammunition from British ammunition dumps, instead of introducing the complication of yet another type, Surely the Americans must appreciate the advantages of standardization! But, as so often happens, expert prejudice prevailed. Production was stopped while the machinery, jigs and gauges were changed over in the factories and adapted to the new rifle. Nothing was produced until the winter of 1917, and in the meantime millions of America's recruits were drilled with broom-sticks. Meanwhile, those American troops, which in fact fought in Europe, were, of course, reequipped, when they landed, with British or French rifles, according to their position in the line.

"And now for the sequel. For a long time past the experts who shoot at Bisley have been dissatisfied with the British Service rifle. The War Office is soon to produce a new rifle; but as it has not yet been put into service it cannot yet be used for the national competitions. The National Rifle Association, however, knew that the War Office had in stock a certain number of what was known as the 1914 pattern rifle, most of which were abroad, but a few thousands of which were in this country. To meet the growing criticism of the Service rifle, which is no longer being manufactured, the Association obtained the consent of the War Office to use these 1914 type rifles in this year's competition which ended last week. The result was a fantastic number of full scores at medium ranges. Over 100 out of 1,000 competitors scored the maximum number of bull's eyes in one competition, and in one case thirty additional shots had to be fired before a decision could be reached. In view of the phenomenal success of this 1914 rifle, the Association intends to make the targets smaller for next year's competition. And these 1914 type rifles, which have been lying in grease for nearly twenty years, are the dispised and rejected weapons from Winchester and Remington whose supposed defects delayed for so long the training of America's armies!"

This appeared in Peiping where General Crozier is visiting.

BUT the keen eye of General Crozier saw the article and his alert mind promptly proceeded to set the record straight. Under the title "The Economist Corrected—General Crozier's Account," the *Peiping Chronicle,* in its issue of August 24th, published the following letter preceded by an editorial note:

"In our issue of August 17 we reprinted from 'The Economist' an article entitled 'Bull's-Eyes: a Wartime Tragedy.' This article caught the attention of General Crozier who was 'the head of the Ordnance Department' of the United States Army at the time the alleged incident took place. General Crozier courteously sends us for publication a copy of a letter of refutation and explanation he has addressed to 'The Economist.' Under normal circumstances we should not publish such a letter until it had appeared in the columns of the contemporary to whom it is addressed, but in view of the great length of time that would otherwise elapse between now and the date at which we could reproduce the letter from our contemporary's columns we feel justified in departing from the usual rule."—Ed.

'The Editor of "The Economist," 8 Bouverie Street, London, E.C.4.

SIR:

'Under the title "Bull's Eyes" there is printed in your issue of July 27, 1935, a leading article whose opening paragraph refers to "the lack of imagination and elasticity of the 'expert' when faced with a new and unexpected situation," and contains the sentence: "One of the most striking examples of this woodenness of the official mind was the notorious episode of the British rifle orders placed in the United States." Mine was the official mind whose woodenness was responsible for the action which your article criticizes, and I am moved to write in correction of some of the errors of fact which it is sprinkled with.

'The substance of your criticism is that when the United States entered the war the American War Department did not take over and continue the enormous output of the three American factories, which were then approaching the end of their British engagement, and equip all the American troops with a new British rifle which they had been manufacturing for that Government; with the obvious advantages of celerity of supply and uniformity of ammunition with the British; as you state was urged upon it by the British Balfour Mission, which came to America on a coördinating task in the first month of America's participation, and you find a motive for the action of the War Department in that "the head of the Ordnance Department (myself) was unfortunately a technician keenly interested in a new American rifle, which he claimed to be the best in the world." To the uninformed your criticism seems plausible enough, and I am afraid that the information required to estimate it correctly will be dull reading in comparison with somewhat dramatic charges, entertainingly made.

'The Chief of Ordnance was not interested in any new rifle. The rifle with which the American troops had been armed for over ten years was the Springfield, of the model of 1903, and there was no thought of changing it, for it was believed to have no superior in the world. The supply on hand, however, together with the manufacturing capacity, was not sufficient for the equipment of the new American armies as fast as it was intended to raise them, and I at once took steps for utilizing the three factories making the British rifles to make this same rifle for us; which steps were arranged before the arrival of the Balfour Mission in America, so that no suggestion upon this point was needed from it. The Mission, however, did suggest that the machine plants for manufacturing the British rifles, which had passed—without the buildings—by modification of the contracts, into the ownership of the British Government, and for which it would have no further use, should be purchased by the United States; a perfectly proper suggestion which met with American acceptance, and the plants were purchased by the Ordnance Department, for 10 million dollars. This transaction had nothing to do with the decision for the American utilization of the plants, but was regarded as the most equitable method for arranging compensation to the British Government for their use.

'The Mission also urged, very strongly, that the American troops to be sent over should operate in the theatre of war with the British forces and, as appropriate to such an arrangement, that all the Americans should be armed with the American-made British rifle, firing the old model British ammunition. But a different decision as to operation was made by the American Political Government: that the American land forces should operate with the French, and the sea forces with the British; which practically nullified the importance of uniformity of the ammunition to be used by the British and by the American troops. The few American divisions which did subsequently operate, temporarily and in emergency, with the British, exchanged their superior American-made rifle for British rifles while so serving, for convenience of ammunition supply. But no American troops were at any time armed with French rifles, as erroneously stated in your article, nor was it ever suggested by anybody that they should be.

'IT would have been possible to arm the American troops going overseas entirely with the American-made British rifle; but there were strong reasons against such a course. It would have involved retiring some 500,000 Springfield rifles on hand, and retiring also the two government factories, with a combined capacity of 1,500 rifles per day, either permanently or for some ten or twelve months, while the special tool and gauge equipment for making the British rifle was being substituted for their Springfield equipment; which last task would have occupied highly specialized technical capacity urgently needed for other war purposes. In addition, the Springfield type was considered the better of the two, and its ammunition very much better, being quite similar to that for which the new British rifle had been originally designed. Again, the American-made British rifle (which, by the way, came to be known in our service as the "American Enfield", in contra-distinction to the old Lee-Enfield which was continued in use by the British forces in France) had very poor interchangeability of parts, a point regarded as of first degree importance by all military men. The American manufacture of the British rifle had been put into effect under such pressure for haste that the manufacturing equipment provided little interchangeability in the output of each single factory, and practically none at all as between the different factories.

'For the above reasons the Springfield rifle was continued in service, and in initial supply and war time manufacture contributed some 800,000 to the American armament. The issue of two types of ammunition to the American forces, for the Springfield and the American-Enfield rifles, was avoided by altering in manufacture the bore and chamber of the American-Enfield so that it should use the Springfield ammunition; and at the same time such changes of the appro-

priate part of the equipment of the private factories were made as to produce very satisfactory interchangeability of parts in the output of all three of them.

'In regard to these changes your article says: "But as so often happens, expert prejudice prevailed. Production was stopped while the machinery, jigs and gauges were changed over in the factories and adapted to the new rifle." This statement embodies the singular error of supposing that the great changes were made which would have been required for adapting the manufacturing equipment to the production of the Springfield rifle, spoken of earlier in your article as a "new American rifle" in which the Chief of Ordnance was keenly interested, which was very far from the truth.

'The changes not only gave the American troops uniformity of ammunition for the two types of rifles used by them, and interchangeability of parts in the type, which had lacked it, but greatly facilitated manufacture by standardizing theretofore little standardized parts. For example: The best record of the three private factories, during production for the British, in the assembly of rifles had been 50 rifles per man per day. After the changes the best record was 280 per man per day, and the average was 250. And incidentally, the cost was reduced by 25 per cent.

'YOUR statement goes on to say: "Nothing was produced until the winter of 1917, and in the meantime millions of America's recruits were drilled with broomsticks." This ignores the continuing output of Springfields by the American Government factories; and is besides in error, in that the delivery of the "American Enfields" commenced in August, 1917, and was carried on at such a rate that, together with the contribution Springfields by Government factories, all shortage was wiped out by January, 1918, never to reappear, or any threat of it, although recruits were called up in hundreds of thousands greater numbers than there was any possibility of transporting to Europe. The first drafts were enthusiastically called so fast that the reserve of Springfield rifles was not sufficient for their armament, even when supplemented, for target practice, by a further reserve of about 150,000 Krag-Jorgensen rifles, a good small bore, magazine, bolt gun, which had been discarded for the model of 1903. There was not therefore, at first, a rifle for each man, although there were quite enough for training in target practice for everybody. Whence the "broomstick" of your horrified comment; which were in reality wooden dummies with bayonets formed on them, such as are often used for training recruits in simple drill and bayonet exercise.

'In your last paragraph, commencing, "And now for the sequel," you give an interesting account of the way in which your National Rifle Association procured the use in this year's competition at Bisley of the American-made British rifles, come to be known with you as the "1914 pattern," of which your War Office had a certain number still in stock. This because of "the growing criticism of the Service rifle, which is no longer being manufactured." After describing the "phenomenal success" of these rifles you conclude: "And these 1914 type rifles, which have been lying in grease for nearly twenty years, are the despised and rejected weapons from Winchester and Remington whose supposed defects delayed for so long the training of America's armies." These rifles were not despised and rejected by any American authority. On the contrary, their good qualities were recognized from the beginning, and they were adopted and manufactured in enormous numbers for the American Service, with only the modifications mentioned above, neither of which had anything to do with the merits of the type, but which made it a splendid gun, a worthy rival of the Springfield, although not quite its equal in the opinion of the American Service, which, after the war, retained the Springfield and retired the "American-Enfield;" although the supply of the latter had become much the greater because of the large capacity of the three private factories. And no significant delay whatever in the training of America's armies was incurred.

'Most of the points mentioned in this letter are covered in the American War Department publication "America's Munitions," issued by the Government Printing Office in 1919, and in my book "Ordnance and the World War," published by Charles Scribner's Sons, in 1920; save the story of the equipment of American troops with French rifles; because that particular error has never before, to my knowledge, appeared, but was left for commission by "The Economist" seventeen years after.

'The decision in this rifle matter was one of the most important taken with reference to the preparation of the American armies for participation in the great struggle. It was approved and confirmed at a conference presided over by the Secretary of War, at which were present the Chief of Staff, the President of the War College, the Commandant of Marines, General Pershing, who had already been designated to command the Expeditionary Force, and myself; and the outcome showed that there was no matter connected with the prosecution of the war in which the American forces were more adequately served than in this, the most important item of fighting material, the infantryman's rifle. The action was thoroughly vindicated by the result and was taken under the shelter of such margin as appears from the fact that the supply of Springfield rifles on hand when the United States entered the war was more than twice as great as the total number of rifle-carrying troops which had been transported to Europe a full year later, before which time an abundant surplus had been accumulated.

'It is astonishing to find so much error of fact and misconception of motive and result packed in this short editorial article of the usually careful and reliable "Economist." The article has been republished in this city where I am temporarily sojourning, and I am therefore handing a copy of this letter to the local Press. I request that you give the letter the same prominence in your columns that was accorded to the article to which it is a reply. Sincerely yours, WILLIAM CROZIER, *Major General, U. S. Army, Retired.*'

Defense of the Suez Canal

Second Phase—February, 1915, To The Battle of Romani

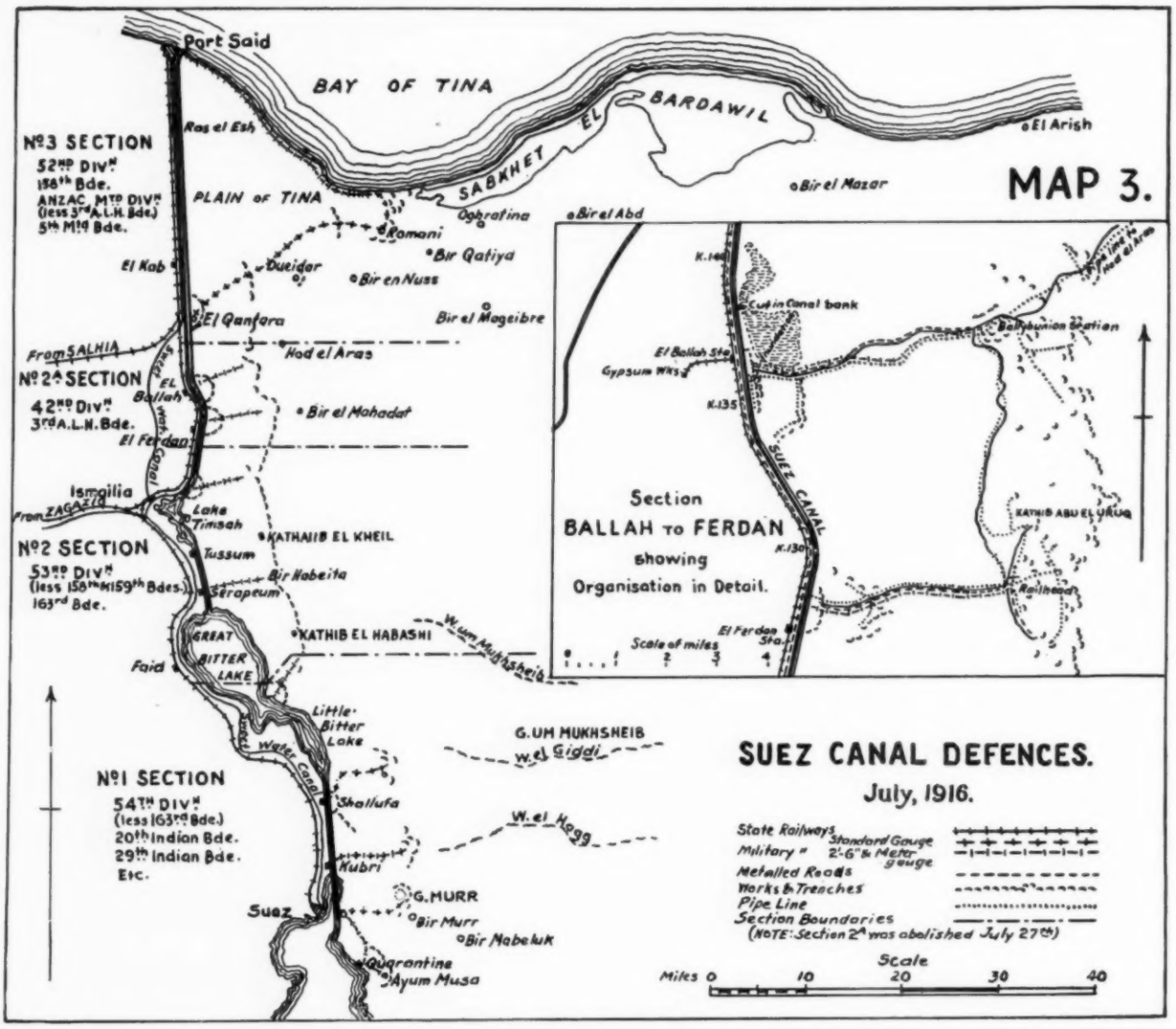
By Fred. H. Wagner*

THE immediate menace to the canal was now removed and a period of quiet ensued in Egypt. Information received was to the effect that the repulsed Turks were demoralized by their defeat, to which was added the hardship of their return march. It also appeared that ill will towards the overbearing but efficient German staff officers was already making itself felt among the Turkish troops, an ill will which continued to grow as the war progressed.

The British were not, however, left without minor attacks on the canal but these were all repulsed, the last activity of the enemy having developed on May 30, when an attempt to bomb the canal was set at naught.

In the meantime the proposed evacuation of Gallipoli was being debated. This would set free considerable Turkish forces, besides which, since Bulgaria had entered the war and the Serbians had been driven from the Constantinople railway, the Germans were given increased facilities for reinforcing and equiping the Turkish armies. Turkish railway activity in Palestine was sufficient proof that the enemy had not abandoned his attack on Egypt. It was reported that Enver Pasha had declared in Turkish Parliament that the repulsed expedition had been no more than a highly successful reconnaissance to prepare the way for the real effort.

Defense of the Suez Canal upon its own banks was abandoned, and it was decided that the line of resistance should be removed far enough to the east to points where enemy artillery fire could not reach the canal. A reconnaissance was made and it was proposed that the line of outer defenses should run roughly some 11,000 yards east of the canal and the lakes, passing through Ayum Musa, Gebel Murr, Kathib el Habashi, and Kathaib el Kheil, whence it would skirt the eastern edge of the inundations on the Plain of Tina to the sea (See Map 3).



*Consulting Engineer, Baltimore, Md. Colonel, Ordnance Auxiliary Reserve, U. S. Army. Part I of this article was published in the September-October, 1935, issue.

A second line of defense was to be located about 4,500 yards behind the first, and the third line was to consist of a series of mutually supporting works covering bridgeheads and vital points on the east bank, these last two lines being covered by the fire from the warships in the canal and lakes.

To accomplish all this was an enormous task, but Egypt possessed ample labor and technical skill to organize and direct it. The only source of water to the canal district was the Sweet Water Canal, hence to supply the troops on the east bank the Suez Canal had to be crossed and filtration had to be devised to make the water fit for drinking purposes. A series of reservoirs were established on the east bank: these were connected with the filtration plants on the west bank by means of syphons. This was not, however, practicable at some points, such as at Kabrit, on the shore of Great Bitter Lake, where the reservoir had to be filled from boats, while at Esh Shatt, opposite Suez, the water was led down by pipeline from the reservoir at El Kubri. The water was pumped from these concrete reservoirs to the advanced positions where distribution was effected by means of auxiliary tanks.

Road communications were necessarily very extensive; the floating bridges were increased and improved and crews were trained to operate them. The work on the defenses began with the establishment of a series of posts so arranged that they could be linked up at a later date into a continuous or semicontinuous line. A hurdle factory and saw mills were established at Port Said to provide material for the revetment of trenches. The sole means of communication between Egypt proper and the canal was by means of the Cairo-Ismailia Railway, and from Zagazig on this was a single line for a distance of 50 miles. This part of the line was double-tracked to Ismailia and the branch line from Zagazig to Salhia was continued to the canal at Qantara in order to provide a second line of communication.

Camel convoys had to be provided, but considerable difficulty was experienced in obtaining suitable animals, since of some 150,000 camels inspected in December and January only 13,000 were considered fit for purchase.

Lieut. Gen. Murray was placed in command of the Mediterranian and General Maxwell was left in command of Egypt. When General Murray arrived he found the canal a scene of intense activity, where fleets of dahabiehs from the Nile were carrying stone and railway material to the termini of the roads and railway on the east bank, as well as pipes for the pipelines. Light railways in the Delta were picked up and transported to the canal zone. Everything was progressing rapidly but the advanced line was not as yet occupied by troops, due to delays in establishing the water supply through lack of piping. Consequently on January 13, 1916, General Murray ordered his corps commanders to the canal to take over the work and prepare schemes of defense.

General Murray was not content to adopt a system of passive defense. He was of the opinion that the defense of Egypt from the east could best be accomplished by an advance across Sinai to El Arish. Reconnaissances made by the Royal Flying Corps and seaplanes of the Royal Navy Air Service in the middle of February established the fact that there were no signs of concentrations in Southern Palestine for an attack on Egypt. Mounted patrols from the XV Corps were pushed out into the desert for a distance of 20 miles, or to Bir en Nuss and Hod um Ugba, where they found the area clear of the enemy. Another reconnaissance from Tor ran into a small force and ejected the latter from its camp. In the Central Sector a squadron of Australian Light Horse and a detachment of Bikanir Camel Corps made a raid on Jifjafa, a distance of 52 miles, between April 11 and 15, where they destroyed a well-boring plant. A party from the IX Corps in the Southern Sector reconnoitered 30 miles to Bir el Giddi and the tracks leading east therefrom.

On April 9, however, a squadron of the Worcester Yeomanry located a strong body of Turks at Bir el Abd, 15 miles east of Qatiya, and by the third week of the month the entire 5th Mounted Brigade was disposed to cover the railway to Qatiya; the 2nd/2nd Lowland Field Company, R. E., was attached to the brigade for the development of wells. The brigade had no artillery, the ground being soft sand over which wheels could scarcely move, and the water supply for the horses was far from plentiful. On the 21st and 22nd two squadrons of Worcester Yeomanry pushed out of the Oasis of Oghratina, a squadron of Gloucester Hussars replacing them at Qatiya until the arrival of the 5th Australian Light Horse. This regiment was sent to reinforce General Wiggin's forces, renewed activity of the enemy having been evidenced by an attack on an outpost of the Warwick Yeomanry from Bir el Hamisah at dawn on the 19th.

The small oasis of Dueidar was held by 156 rifles of the 5th Royal Scots Fusiliers and Yeomanry, while Hill 70, in the advanced line, was held by the 4th R. S. Fusiliers, the latter from the 52nd Division holding this portion of the front. The British were now in a position to hold Qatiya in greater strength, and it was at this moment that the enemy struck a blow which for combined speed, skill, daring and success was scarcely to be matched during the entire campaign.

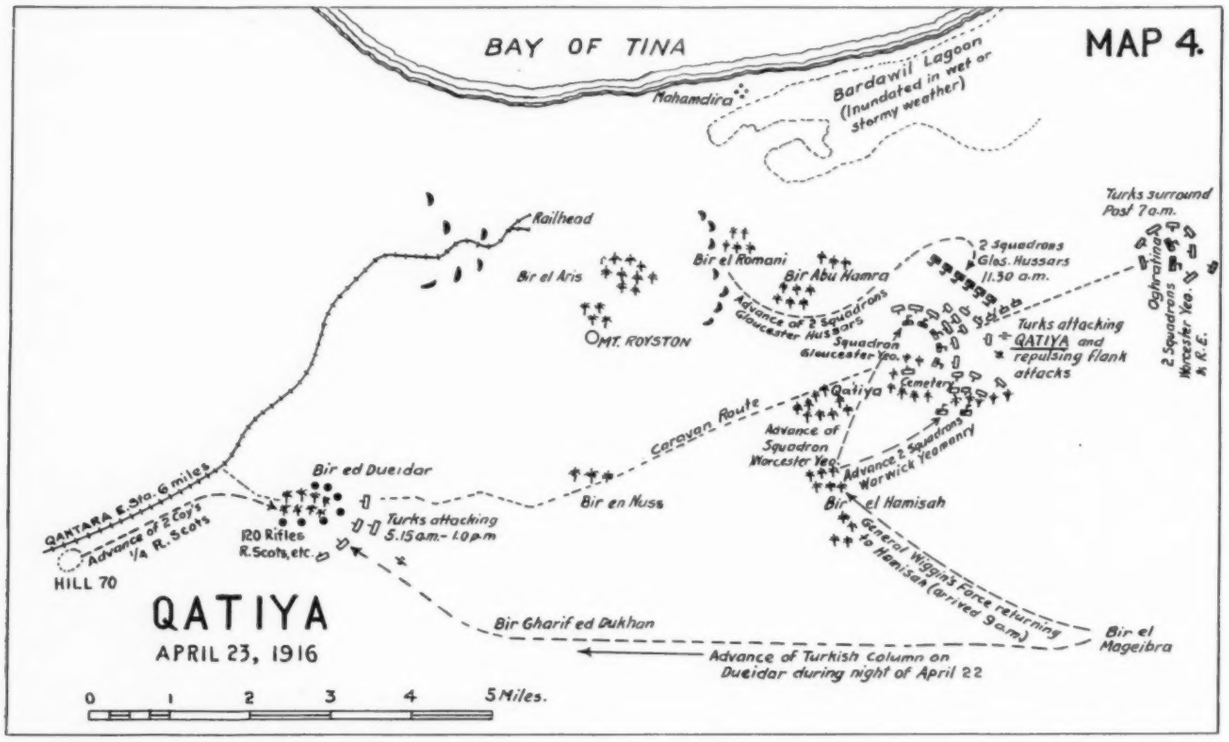
A report had been received by Brigadier General Wiggin to the effect that the enemy party, about 200 strong, which had executed the raid on his outpost on the 19th, was camped at Bir el Mageibra, 8 miles southeast of Hamisah. After obtaining approval from General Lawrence, Wiggin arranged to raid this camp, deciding to command the raid in person. Wiggin arrived at Hamisah on the 22nd with headquarters and one squadron plus one troop of Worcester Yeomanry from Gatiya. His forces were distributed at Oghratina, Qatiya, Hamisah and Romani, the Gloucester Hussars at the latter camp being in reserve. Wiggin's raid coincided with the Turkish advance. Upon arriving at Mageibra at dawn on the 23rd, he found a considerable camp, but it was practically empty; he captured a few Turks, dispersed the remainder, and then destroyed the camp. At 9 a. m. he had returned to Hamisah with tired horses in need of water, and there received word of the Turkish attack.

ON the morning of April 23 Oghratina had been occupied only about thirty-six hours by one squadron and a detachment of Royal Engineers; the second squadron arrived twenty-four hours later. Very little entrenching had been completed, but the camp was on the alert and stood to arms at 4 a. m. in a dense fog. Suddenly the sentries of "D" Squadron on the left of the line, heard the sound of pumps at the wells 500 yards southwest of the camp and at the foot of the slope occupied by the squadron. It was assumed that "A" Squadron was watering, but Captain Ward ran down the slope to investigate, almost barging into the midst of a party of 60 Turks located in a hod south of the wells. He immediately returned, collected all the men he could find in the fog, and opened fire at pointblank range on the enemy, forcing them to precipitous retreat. Ward followed them but was met by

such heavy rifle fire that he became convinced he had not been surprised by a small party and he fell back to the line held by his squadron.

"A" Squadron on the right was soon afterward heavily attacked. At 5:15 a. m. the entire camp was assaulted by overwhelming forces from the north, east and southeast. Almost from the first the troops were firing at a range of 50 yards or less. The detachment, under Major Williams-Thomas, had orders to retire if attacked in force, but this was impossible unless he chose to abandon his dismounted men.

A patrol was sent out toward Oghratina at 8:45 a. m., and thus was discovered two lines of troops, of about 300 men each, 1.5 mile distant but advancing on Qatiya in open order. Another body of troops could be seen behind this advancing force, while cavalry was discovered advancing southwest in an attempt to surround the post. A battery of mountain guns opened fire on Qatiya at 9:45 a. m. from the direction of Er Rabah, northeast of the post. The first shells passed over the camp but the following ones began to burst in the horse lines, resulting in killing or maiming most of the horses within a


BAY OF TINA
MAP 4.
Mahamdira
Bardawil Lagoon (Inundated in wet or stormy weather)
Railhead
Bir el Aris
Bir el Romani
Bir Abu Hamra
2 Squadrons Glos. Hussars 11.30 a.m.
Turks surround Post 7 a.m.
Oghratina
2 Squadrons Worcester Yeo. & R.E.
MT. ROYSTON
Advance of 2 Squadrons Gloucester Hussars
Squadron Gloucester Yeo.
Turks attacking QATIYA and repulsing flank attacks
Cemetery
Qatiya
Caravan Route
Advance of Squadron Worcester Yeo.
Advance 2 Squadrons Warwick Yeomanry
Bir el Hamisah
Bir ed Dueidar
Bir en Nuss
Turks attacking 5.15 a.m.- 1.0 p.m
120 Rifles R. Scots, etc.
Advance of 2 Coys 1/4 R. Scots
QANTARA E. Sta. 6 miles
HILL 70
QATIYA
APRIL 23, 1916
General Wiggin's Force returning to Hamisah (arrived 9 a.m.)
Bir Gharif ed Dukhan
Bir el Mageibra
Advance of Turkish column on Dueidar during night of April 22
0 1 2 3 4 5 Miles.

He felt that duty demanded he stand by the engineers. Had this not been necessary he might have disengaged his two squadrons and have fought a rear-guard action back to Qatiya: however, the remnants of "D" Squadron were driven back on the second line of defense, which was held by the engineers. That position was speedily forced also, after which the Turks had the entire camp at their mercy. By 7:45 a. m. the casualties had amounted to 11 Yeomanry officers and 135 other ranks, while half the rifles in the hands of the unwounded were clogged with sand. Continued resistance would not have served any useful purpose, consequently the remnant of the detachment surrendered. The Turks who had made this attack had advanced along the caravan route from Bir el Abd.

A squadron of Gloucester Hussars stood to arms and saddled up at Qatiya at 3:30 a. m. The incoming patrol reported everything quiet but not long afterward an enemy patrol fired into the camp and then swiftly disappeared in the mist. From the direction of Oghratina came the sound of heavy firing A message received at 6 a. m. said the enemy there had been repulsed. Thirty minutes later word came that the attack had been renewed, followed by a message from Romani to the effect that Dueidar had also been attacked. This was followed by an attack by another enemy patrol at 7:45, but this was repulsed. At this time no sound of firing at Oghratina could be heard, the fog gradually lifting.

few minutes. Aërial reconnaissance by the enemy followed; the airplanes flew low, probably seeking the location of any British artillery. With the fire of the enemy artillery came his advance, the Turks crawling forward in small parties covered by rifle fire.

IN the meantime General Wiggin, upon his arrival at Hamisah, learned that Oghratina was surrounded and soon after received word that the Turks were advancing on Qatiya. The squadron of Worcester Yeomanry, under Lieut.-Colonel Coventry, was ordered to Qatiya; the horses had to be watered first, but before this was finished shells were bursting at that post. The squadron got under way at 9:50 a. m. When Qatiya came in sight it was seen that the camp was heavily engaged; the squadron dismounted about three-quarters of a mile west of the camp and proceeded on foot to the left flank of the Gloucester squadron already engaged. The pressure on that flank was relieved and the Turks fell back some distance, but a heavy fire battle continued for several hours. After the destruction of the horses the enemy artillery ceased fire, but his rifle and machine-gun fire continued with great intensity. Under the cover of this fire the enemy infantry pressed in on front and flanks.

The first of the British remaining squadrons, which consisted of Warwick Yeomanry, watered at Hamisah and then

moved off at 10:30 a. m., followed by General Wiggin and the other squadrons fifteen minutes later. Wiggin intended to attack the enemy in the rear, in the neighborhood of Hod um Ugba, northeast of Hamisah, but half way to Qatiya he became engaged with the Turkish flanking troops. Wiggin slowly fought forward for about a mile, but at 1:45 p. m. opposition became very strong, while his own men and horses were tired out. Not long afterward he saw a commotion among the camels in Qatiya, followed by flames among the tents. This made him decide that his forces could be of no more assistance and that he had better fall back on Hamisah, from which camp he could hear the sound of machine-gun fire which proved to be only an exchange of shots between the camp and a body of the enemy retiring from Dueidar and pursued by airplanes.

At 10:15 a. m. the commander at Romani, Lieut.-Colonel Yorke, moved out with five troops and a machine-gun section of Gloucester Hussars. He knew nothing of the attack on Qatiya, his movement having been intended to intercept a force of 500 Turks which, he was informed, was retiring southeast from Dueidar in a disorganized condition. Shortly after leaving Romani he became aware of the firing at Qatiya, ascended some heights and discovered the enemy artillery north of Er Rabah shelling the Qatiya camp. His direction was immediately changed but upon his approach the guns ceased firing and withdrew some distance. At 10:45 a. m. his advanced guard came under fire northwest of Er Rabah; he pressed forward and drove the Turks back to the high ground south of the Hod um Ugba. Unfortunately the enemy became reinforced; his rifle fire became so heavy that further progress was impossible, hence he gradually withdrew with long halts to permit his wounded to reach Romani. The Turks followed him at 1 p. m. but the enemy artillery fire from its new position had little effect. At about 3 p. m. Yorke, then about a mile east of Abu Hamra, discovered Wiggin's retreating troops and, seeing that Qatiya was in the hands of the enemy, he decided to retire to Romani at once. He remained there until midnight when, upon receiving a message that no infantry could be sent to his support, he fell back on the railhead. Qatiya was lost and of all the British in the post only about eighty escaped.

DUEIDAR was a small oasis defended by a half-dozen small works outside the line of trees, the garrison consisting of 156 rifles. Communication with Qatiya was interrupted at 4 a. m. A linesman was sent out to make repairs while Captain Roberts, 5th Royal Scots Fusiliers, commander of the camp, visited his posts. Upon his return he sent out a patrol of Yeomanry to the southeast, his remaining troops standing to arms. The patrol returned and reported everything quiet, not having observed any enemy through the fog. Suddenly, at 5:17 a. m., a large body of the enemy appeared in front of the principal redoubt to the southeast of the oasis. The sentry, upon discovering them, fired his rifle but the Turks made a dash forward. Although the garrison had no idea of an enemy nearer than Mageibra, 20 miles away, it was alert, and the fire of the fifty rifles and the Lewis gun in the redoubt swept the Turkish lines, causing the enemy to recoil and leave some twenty dead and wounded on the ground.

A mountain gun now opened fire out of the mist, but since the British position could not be seen, the fire was so erratic it did little damage. At 7 a. m. the Turks attempted a flank movement on the south under cover of heavy rifle fire; this movement was checked by the rifle fire of seven men in a little work on the flank. With the shout of "Allah" the enemy again charged the redoubt, but was again routed by the steady fire of the British, some of the enemy falling within twenty yards of the wire. This was followed by the enemy's ineffective artillery, machine-gun and rifle fire. In the meantime, Major Thompson, 4th R. S. Fusiliers, stationed at Hill 70 on the railway and 5 miles in the rear, was ordered to reinforce Dueidar with two companies. He moved off at 7:05 a. m. and, upon approaching the oasis, he sent up a small detachment to reinforce the redoubt, while he went forward to estimate the situation and take over command. He found the enemy had a firing line to the south some 200 yards from the redoubt. He could find no Turks to the north and no attack had been made from that quarter. He consequently sent a party to an unoccupied and isolated work, northeast of the oasis, with orders to open enfilade fire.

The mist now cleared somewhat and a British airplane was discovered coming towards the oasis. A message dropped from this plane announced that the main body of the Turks was retreating and that the firing line in front of Dueidar amounted to no more than 150 rifles. A squadron of the 5th Australian Light Horse arrived at noon and started in pursuit of the retreating enemy; the British garrison issued from the works and attacked the rearguard along the entire line, causing the Turks to break and flee. After a pursuit of about 1.5 mile the British returned with some prisoners. At 1:30 p. m. the remaining Australian squadrons arrived and took up the pursuit.

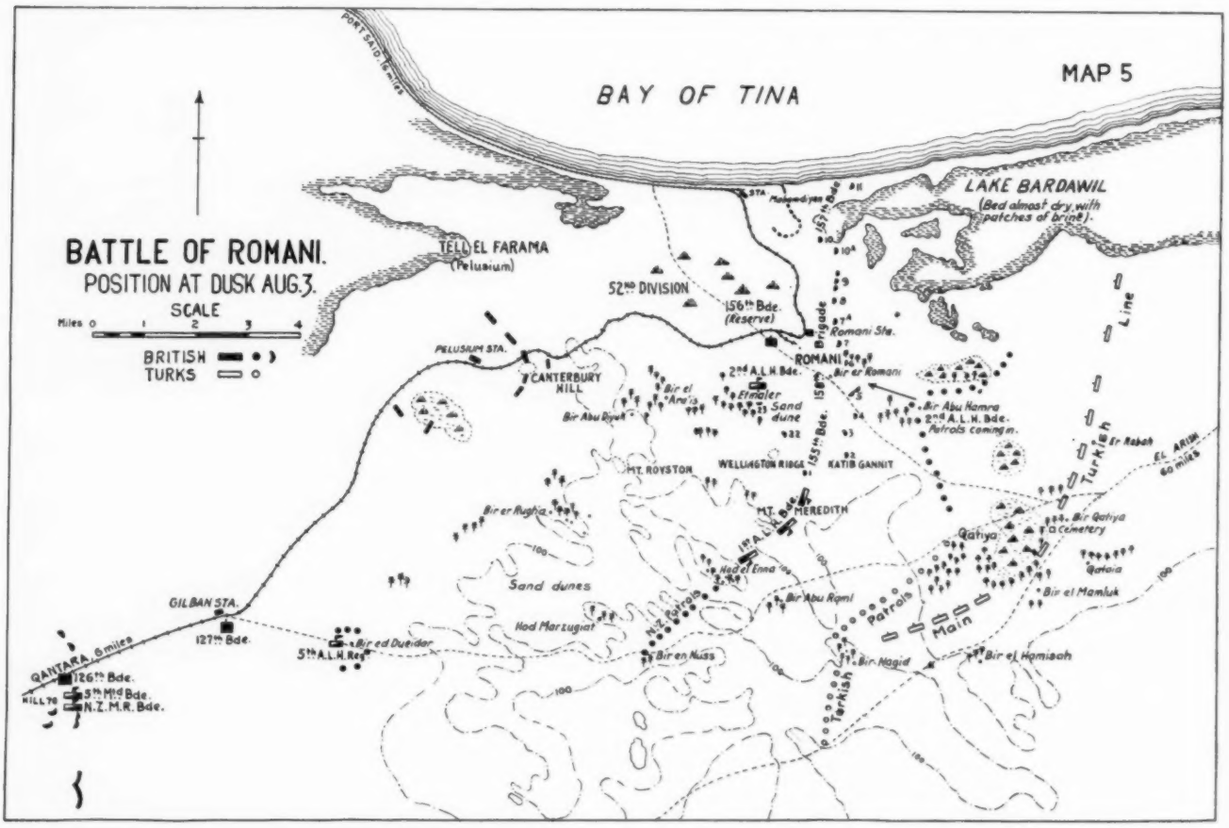
General Wiggin arrived at Dueidar with his two squadrons, the outer line of defense now ran from the railhead to Dueidar. Both positions were reinforced but the attack was over and the enemy in retreat, followed on the 24th by airplanes dropping bombs and machine-gun fire on the fleeing Turks.

These affairs, coming generally under the head of Qatiya, were a very lamentable occurrance; they resulted in the loss of three and a half squadrons of Yeomanry. They had no effect except to delay work on the railway for a few days. Major-General Chauvel, commander of the A. and N.Z. Mounted Division, was given the command of the advanced positions, which included the 52nd Division's post at Dueidar. The next day saw the reoccupation of Romani, but in view of what had happened, this post received considerable reinforcements and the area was vigorously patrolled in place of depending upon dangerously isolated detachments at the other oases.

THE 52nd Division moved to Romani (See Maps 5 and 6) between May 11 and June 4; a strong position was developed there with its left flank on the Bay of Tina and its right covering the new railhead at Romani Station. The position was supplied by the main railway from Qantara and the narrow-gauge line from Port Said to Mahamdiyah. Water was to be supplied by a 6-inch pipeline, but due to lack of pipe, June 4 saw only 17 miles of pipe laid from Qantara to the west of Pelusium Station. This required that the troops at Romani be supplied with water either by trucks from Qantara or by camel convoys from the pipehead near Pelusium Station. The 6-inch pipeline was, however, found inadequate and it was replaced later with a 12-inch line.

The defensive position ran southward from Mahamdiyah over a line of high sand hills, the latter marking the eastern edge of a very soft and shifting sand area. To the east of

this natural line of defense there was a slope of the ground down to harder sand and much lower dunes; this permitted of easier movement, and the large oasis of Qatiya was within sight of the Romani heights. The principal tactical point was the Katib Gannit dune, at the southern end of the line, which stood 100 feet above its neighboring hillocks. On the eastern slopes of the Romani heights, and between the shore at the western end of the Bardawil Lagoon and Katib Gannit, twelve works were constructed in the first line, about 750 yards apart, while another series curved to the west and then north, thus



forming a hook, for the protection of the right or southern flank. A total of eighteen of these works was constructed. When fully garrisoned they held from 40 to 170 rifles each, or an average of 100 rifles. One Lewis gun and an average of two Vickers guns were allotted to each work. It was impossible to conceal the works, without sacrificing rifle fire; they were all wired, but when the Battle of Romani opened the spaces between them, except on the right flank, were not covered by wire.

The troops in camp at Romani suffered severely from the hot southerly wind, the *Khamsin,* (meaning "fifty"—the Bedouin believe that this wind blows once every fifty days), lasting sometimes only a few hours and sometimes for several days. Very little activity was displayed during the hot season, except in the air. The canal was visited twice during May by enemy airplanes; bombs were dropped on Port Said, but with the exception of 23 casualties to troops and civilians, no material damage was done. British reprisal took place on the 18th when El Arish was bombed from the air. On the 22nd all enemy camps on a front of 45 miles parallel to the canal were bombed by the Royal Flying Corps.

Turkish air activity continued to increase, hence the British planned another raid on El Arish for June 18. Since surprise was the essence of the raid, the British planes kept out to sea until past the oasis; they then turned inland and gave their attention to the Turkish airdrome. Although three planes were brought to earth by Turkish fire, the British destroyed two enemy planes on the ground, set fire to two hangars and bombed four others, besides making successful attacks on several parties of Turkish troops by both bombs and machine-gun fire. The heat was so intense that a patrol from Romani became so exhausted from lack of water that many of the troopers lay unconscious in the groves of Qatiya for hours. Another raid on June 31 at Bir Salama was successful when British planes bombed the fleeing Turks. A further important move made during this month, in the Second Sector, was an operation intended to deny the water supplies in the Wadi um Mukhsheib, which the Turks had employed in their attack on the canal the previous year. After three day's work in the intense heat, the stone cisterns, which caught the overflow from the wadi, were pumped dry and water pools were ditched by explosives, thus disposing of five million gallons of water, after which the cisterns were sealed to prevent storage of the next season's rains. This made the Central Sinai route impossible for the enemy. The area open for any serious offensive was narrowed down to the coast line route, but here the British were prepared for the attack.

The early days of June also witnessed the revolt of the Arabs in the Hejas against the Turks, and General Murray was ordered to consider seriously an advance on El Arish, but it was not expected that this move could be made before October.

The early part of July was quiet. The season being far gone by this time, it appeared that the long anticipated Turkish offensive would not occur until the arrival of winter. This

anticipation was not, however, to be realized, since on July 17 Turkish aircraft began to exhibit considerable activity in the neighborhood of Romani. The Turks were supplied with German planes, which were considerably faster and better climbers than those at British disposal. Thus the Turks established definite aërial superiority but this did not prevent British reconnaissance of the areas ahead. On July 19 air reconnaissance located a force of some 2,500 Turks at Bir Bayud with a smaller force at Gameil, west of Bir Bayud. Another force of 2,500 men was discovered on the northern route; some 6,000 camels were seen at the camps or while moving between Bir el Abd and Bir Salmana. The morning of the 20th revealed another Turkish movement forward when 3,000 men were found entrenched at Mageibra, while Bir el Abd had apparently been made an advanced depot for supplies and stores. A small force, which by the following morning had increased to 2,000 men, was also located near Oghratina. This all seemed to be definite evidence of a contemplated Turkish offensive.

THE Romani position was consequently reinforced but, due to a shortage of water for the teams, only a relatively small proportion of the available artillery had been brought up. The guns in position, consisted of one battery of 60-pdrs., two batteries of 4.5 cm. howitzers, and four 18-pdr. batteries which with the Ayr and Leicester R.H. Artillery and the A. and N. Z. Mounted Division, brought the total to 36 guns. The movement of artillery across the sands had been greatly aided by the employment of "ped-rails"—or short wooden planks attached to the gun and wagon wheels which distributed the weight on the sand over a considerable distance and thus minimized the sinking of the wheels. Since the limited water supply also affected the men, General Murray did not increase his infantry but moved up two machine-gun companies. He also ordered the concentration of a small mobile column of mounted troops and Imperial Camel Corps in the Second Sector and assembled the necessary camel transport to enable the 42nd Division to advance into the desert.

On July 20 a demonstration was made against Oghratina, where several prisoners were captured and from whom the Turkish order of battle was learned. It was thus ascertained that the enemy force was under the command of a German staff officer, Oberst Kress von Kressenstein, and consisted of the 32nd Division and a regiment of camelry, together with a number of special machine-gun companies and heavy and mountain artillery, officered and partly manned by Germans and Austrians. One of the two Light Horse brigades at Romani was sent out toward Qatiya every morning at 2 a. m., where it bivouacked till after dawn, after which it advanced on a wide front until it had drawn the enemy's fire. Should the enemy outposts be weak they were driven in; but if they appeared disposed to counter-attack the brigade slowly retired, usually reaching camp at nightfall.

The Turks remained quiet until the 28th, when they were found in occupation of the Hod um Ugba, five miles east of the British line. It was proposed by Lieut.-Colonel Meldrum, in command of the Wellington Regiment, that since this position appeared to be weakly held he proceed to eject them. This suggestion was approved; the attack was made by two squadrons, supported by two guns and several machine guns, and resulted in driving the enemy from the hod with the loss of eight prisoners. G.H.Q., however, was somewhat puzzled by the enemy's cautious advance and the careful entrenchment of his successive positions; it was later known that the long pauses were due to delay in the arrival of heavy artillery, which latter was compelled to move by very short stages necessitated by the construction of tracks over the heavy sands. This delay led the British command to assume that the Turks were not contemplating an attack but were intending to blockade the British advance, in which case they would probably be waiting for reinforcements. If this were the case, it would be necessary to be prepared to deliver an attack before the arrival of the reinforcements. It was not considered possible for the enemy to attack in force except via the northern route, consequently the British were prepared to reduce the troops in the Nos. 1 and 2 Sectors to a minimum It was calculated that all preparations for the equipment of the British force with the necessary animal transport would be completed by August 3, hence General Lawrence was ordered to be prepared to attack the Turkish position about the 13th, the date of full moon, unless the Turks launched their effort sooner.

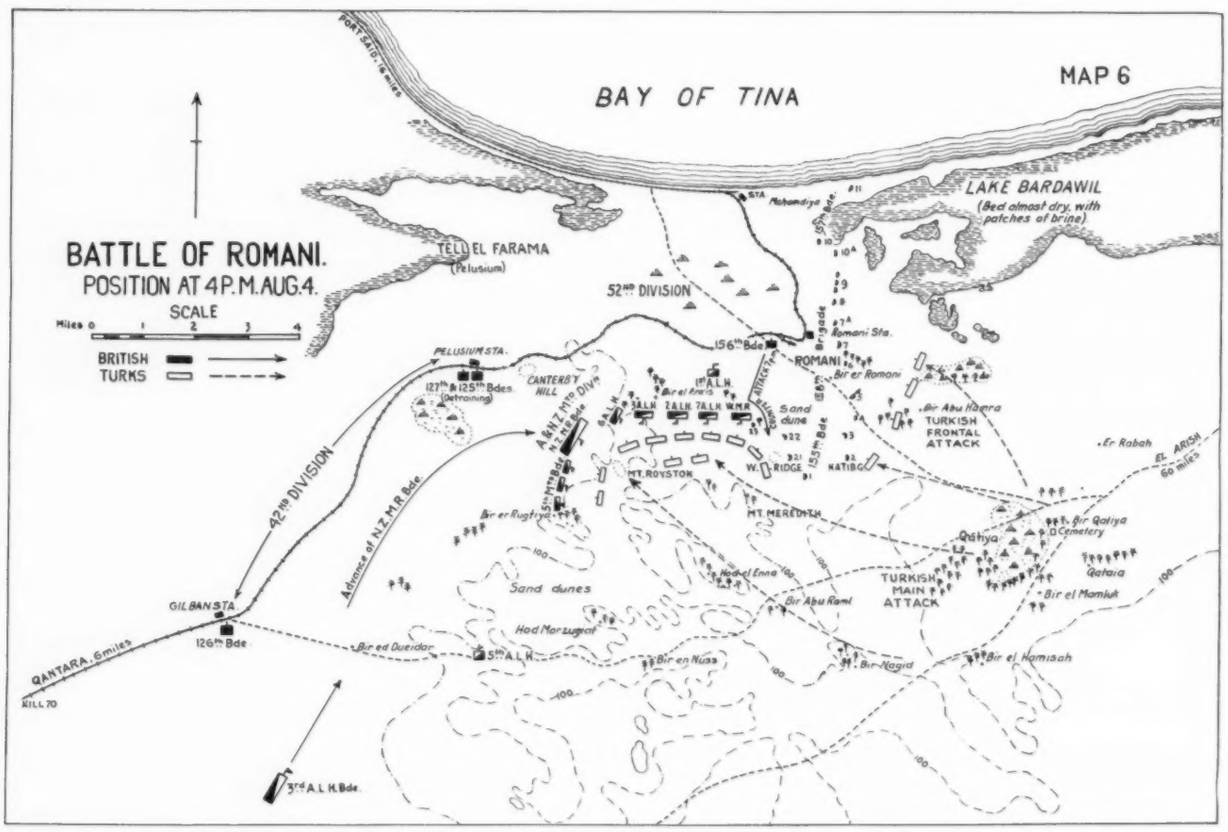
The calculation as to time proved, however, to be wrong, and although the enemy advance to the Hod um Ugba had been disturbed by the Wellingtons on the 28th, this move proved to be the beginning of the Turkish offensive. It was learned on the next morning that the Turkish line again passed through the hod and that it ran for a short distance north of the caravan route and about six miles south of it. By the morning of August 3 the enemy had moved forward to Qatiya, hence it became evident that he was ready to begin his main operation. On this day his line ran northeast and southwest, or from Bardawil Lagoon to east of Qatiya, while his left flank was thrown well forward. Since it was deemed incredible that the Turk would throw his main weight against the prepared defenses, it was anticipated he would make a continuing attack against these and throw his main strength against the British right south of Katib Gannit. Such a maneuver would expose the enemy right flank to an attack on mounted troops. The plan to meet an attack designed to turn the British right flank and pass around it against the camps at Romani and the railway, was as follows: The enemy was to be delayed as much as possible and be made to pay dearly for every foot of ground he might gain south of Katib Gannit, and after he was thoroughly committed, and if possible somewhat disorganized, an attack in flank was to be delivered by the Section Mounted Troops from Hill 70 and Dueidar, and by the 3rd L. H. Brigade from the canal defenses, while the Mobile Column, mentioned above, was to operate more widely against his flank and rear.

The first of the two elements in this scheme was insured by a concealed prolongation of the right flank south of Katib Gannit, and after a careful reconnaissance a position was selected from Katib Gannit to the Hod el Enna, about four miles long; this position was supported by a second one covering the series of parallel gullies, running southeast and northwest, which gave access to the soft sand in the rear of the Romani defenses. Since the preparation of entrenchments here would have betrayed the position to the Turkish aircraft only telephone lines were laid down and the officers of the 1st and 2nd L. H. Brigades were ordered to make themselves thoroughly acquainted with the ground. These two brigades were assigned to the task of delaying the enemy until he could be taken in flank by the remainder of the mounted troops which were echeloned in the rear.

It appeared probable that the Turkish attack would be made on the next morning, consequently the 1st L. H. Brigade was

sent at dusk to occupy the skeleton position southwest of Katib Gannit, with two regiments in line and one in reserve. The preparations were now complete, and British monitors had been lying off Mahamdiyah for several days; these shelled the assembling Turks. At Qantara an armored train was stationed in a siding, ready to go forward and assist in defending the right flank, while all available aircraft had been collected at Ismailia, Qantara, Port Said and Romani.

Although the squadrons on the left, near Katib Gannit, were hard pressed, it developed that the main Turkish attack was directed against Mt. Meredith, a high dune in the center of the line. The enemy charged this hillock accompanied by loud shouts at 2:30, and their masses, made visible against the silver sheen of the sand, presented excellent targets to magazine fire with the result that they were repulsed with heavy loss, the fallen rolling down the steep slope to the



THE British estimate of the Turkish plan was correct, since it was later learned that Colonel Kress had intended a bombardment of the line of redoubts with his heavy artillery, but to employ only weak infantry detachments against them while his main attack was to be thrown against the British right and rear.

The night of August 3 was mild and still. There was a slight haze, but the shimmer on the sand made it possible to distinguish objects moving at a distance of a hundred yards. Suddenly a few shots fired out in the desert to the southeast made the piquet line of the 1st and 2nd L. H. thoroughly alert. Midnight had almost arrived before a post reported a large body of men moving before its front. It was later learned that this body of the enemy had followed the 2nd L. H. Brigade in its usual evening retirement from before Qatiya with the hope of passing around the flank of the British position on its heels. Upon being assured of the enemy advance, the commander of the 1st L. H. Brigade, Lieut. Colonel Meredith, called up his third regiment. The Turks, finding the gullies held, came to a standstill, followed by an hour's silence. Suddenly heavy fire burst out along the entire front, under cover of which the Turks, in considerably superior strength, moved forward and at 2 a. m. they were in many places within 50 yards of the Australian line.

ground below. The steady enemy pressure on its flank, however, made the hill untenable, and it was necessary to abandon the position at 3 a. m. A blow delivered at this time on the flank of the right squadron caused considerable losses, but the troops were ordered to hold their ground until the position in the rear was occupied. The Australians immediately south of the hill were forced back upon their led horses at 3:30, but they disengaged themselves and fell back to the second position. They were swiftly followed by the enemy whose machine guns on Mt. Meredith swept the Australian lines.

Break of day revealed how slender was the British hold on the position and the Australians learned that their right had been outflanked by strong forces. This necessitated the abandonment of the second position; the brigade, with troop covering troop, withdrew slowly to Wellington Ridge, their accurate and steady fire having warded off a general bayonet attack. Enemy artillery fire now opened on the infantry defenses and the camps in the rear where the shrapnel bursts caused some losses but the high-explosive shells were buried in the sand. The 2nd L. H. Brigade arrived from Etmaler at 4:30 a. m., but was not committed to the fight until daylight disclosed the general situation. General Chauvel now ordered two of his regiments to move up on Colonel Meredith's

right. Despite this reinforcement the pressure of the enemy continued and his steady advance up the valley between Wellington Ridge and Mt. Royston continually forced back the British right. The light horsemen were compelled to retire slowly from the ridge between 5 and 6 a. m.; the 6th and 7th A. L. H. still held the western edge. Colonel Meredith's brigade was ordered at 6:15 to withdraw behind the line held by the 7th A. L. H. and to occupy a position north of Etmaler camp. The 6th and 7th A. L. H. retired squadron by squadron at 7 a. m. from the ridge, but the enemy failed to appear on its crest until an hour later, at which time he poured a heavy fire into the camp only a few hundred yards distant. The Ayr and Leicester Batteries opened fire and drove the enemy to behind the ridge. The immediate danger was averted.

THE enemy's outflanking movement was progressing steadily, however, and the situation was somewhat threatening, since the Turks were advancing along the slopes of Mt. Royston, thus turning the right of the 2nd L. H. Brigade, and this despite reinforcement by its third regiment. The commander of "D" Squadron, Gloucester Hussars, at Pelusium, Station, observed infantry moving about in the distance around Mt. Royston; he had received no information regarding the situation but immediately marched his squadron towards the advancing Turks. This prompt action checked the outflanking movement and the enemy was unable to make further progress during the next two hours. The situation appeared ugly but the Turks had already failed in their bold attempt. The heroic resistance of the two light horse brigades had upset the program; the fatigued Turks, who had drained their bottles, were now confronting the increasing heat of the day without water.

Frontal attacks, which produced no anxiety to the British, had in the meantime been made on the main defenses. Extended lines of infantry advanced against Work 4 at 8 a. m. This indicated that although the enemy intended to hold the British infantry to their ground, this attack was for the purpose of overwhelming Works 4 and 5 with heavy artillery fire in order to make a breach for the entry of his infantry. Although the shelling was heavy and accurate, the Turkish attack broke down completely 150 yards from Work 4, this check having been caused by the fire of the cyclist company, attached to the division, and of the supporting artillery. All later attempts to advance here were accompanied by much less resolution. In the meantime, Headquarters of No. 3 Sector, at Qantara, had begun the movement against the enemy left. The 5th Mounted Brigade at Hill 70 was ordered to move at Mt. Royston. A composite regiment, consisting of two squadrons of Gloucester and one of Worcester Yeomanry, moved off at once, the remainder of the brigade preparing to follow. At 7:25, when the situation had cleared somewhat, the N. Z. M. Rifles Brigade was ordered to advance on Mt. Royston via Dueidar, where it picked up its outlying regiment, and to "operate vigorously so as to cut off the enemy, who appears to have got round the right of the A. & N. Z. Mounted Division." The 3rd L. H. Brigade was ordered from Ballybunion to Hill 70 and to send one regiment to Dueidar, the Mobile Column to march on Mageibra.

While these orders were being executed the fight became almost stationary on the A. & N. Z. Mounted Division front. It faced south at 10 a. m. from a point 700 yards northwest of Work 22, north of Wellington Ridge, to the sandhills north of Mt. Royston. When the line fell back, the 2nd and 3rd Regiments came in between the 6th and 7th, hence their order from right to left was 6th, 3rd, 2nd, 7th A. L. H., Wellington Mounted rifles. "D" Squadron, Gloucester Hussars, held its ground one mile N. N. W. of Mt. Royston. The composite regiment, 5th Mounted Brigade, which had arrived in advance of the remainder of the brigade, very opportunely took up a position on the flank of "D" Squadron to 1,500 yards west of Mt. Royston, thus taking in enfilade a strong body of the enemy, which had attacked the squadron, and drove the Turks back to the higher slopes of the hill. General Chauvel, who knew that N.Z.M.R. Brigade was on its way, but who had as yet seen no sign of its approach, sent a staff officer to the commander of the 156th Brigade, in reserve, with the proposal that he move up his infantry to relieve the 1st and 2nd L. H. Brigades; the Australians, after watering their horses, were then to swing around the left flank of the enemy and coöperate with the New Zealanders and 5th Mounted Brigade in an attempt to envelop the flank. These infantry regiments could not, however, respond to this proposal as they were in reserve for a contemplated attack eastward when the moment appeared favorable.

The N.Z.M.R. Brigade had been ordered to move on Dueidar and operate against the Turk's flank. When these orders were issued Mt. Royston was still in British hands. The situation was quite different when the brigade reached Dueidar, since the Turkish line had in the meantime swung around until it faced north, consequently Canterbury Hill was the last defensible position between the dune and the railway. While still a mile from Dueidar, the commander of the brigade was ordered to move north to Canterbury Hill. The brigade arrived there at 11:30 a. m. and found the composite Yeomanry regiment in action against the enemy in position on Mt. Royston. The brigade, however, still lacked the 5th A.L.H., which had as yet received no order of recall so it remained out on the Turkish left. Seeing 2,000 Turks entrenching on Mt. Royston, the brigade swung right to attack that position. The 127th Brigade, 42nd Division, which had been sent up by rail, began detraining at Pelusium Station at about the same time.

The New Zealanders and General Chauvel's brigades got in touch by heliograph, after which Colonel Royston galloped out and explained the situation to the former. General Chaytor, in command of the New Zealanders, then decided to move up between the Australians and the Yeomanry and attack Mt. Royston. The Yeomanry was joined shortly afterward by the remainder of the 5th Mounted Brigade under General Wiggin. The two New Zealand regiments, supported by the Somerset battery, dismounted and began an advance on the hill at 2 p. m., but their progress was impeded by the heavy sand and the fire of an almost invisible enemy. General Chaytor at 4 p. m. arranged with General Wiggin to push home the attack an hour later. Colonel Yorke with one squadron of Gloucester Hussars and two troops of Worcester Yeomanry went against the southern spur of Mt. Royston at a gallop and captured it. The Turks on the crest had not waited for the onset. The Turks down below the crest were concentrated about a battery of pack guns in action. The Gloucesters on the crest shot down the teams, and numbers of the enemy came running up the ridge, raising their hands in surrender. The New Zealanders and the Yeomanry were in occupation of the entire position by 6 p. m., having been supported in the final stages of the attack by the leading battalions of the 127th Brigade. The outer flank of the

Turkish force was thus completely routed. The British took 500 prisoners with two machine guns and the pack battery.

Just prior to the recapture of Mt. Royston a last effort had been made by the Turkish inner flank to advance across the Wellington Ridge but artillery fire drove it back. The Turks also made fresh frontal attacks on the main defenses; these, however, could have been for no other object than to prevent a British advance while the Turkish heavy guns were being withdrawn. All attacks broke down completely and the enemy suffered considerable losses. The 156th Brigade was ordered to attack Wellington Ridge on the left of the A. & N.Z. Mounted Division at 5:50 p. m. The attack was to conform with the counter-attack on Mt. Royston. Bombardment of the Ridge began at 6:45, and just before 7 p. m. the 7th and 8th Scottish Rifles moved south from behind Work 23. The advance, however, met with difficulties due to the coming darkness and the rough ground traversed. The 8th got to within a hundred yards of the crest, but there met heavy rifle fire. They were ordered to advance no further until daylight but to keep the enemy closely engaged during the night with the hope of taking more prisoners in the morning.

The day's fighting was over. The British, with their five mounted brigades, were still capable of new efforts on the morrow, when it was hoped to destroy the opposing force. The British advance began at 4 o'clock the next morning. The A. & N.Z. Mounted Division had orders to press forward with its right on the Hod el Enna and its left in close touch with the 156th Brigade advancing on Mt. Meredith. The 3rd L.H. Brigade was to advance towards Bir en Nuss and attack the Hod el Enna from the south, keeping in touch with the A. & N.Z. Division or the 5th Mounted Brigade, which latter was to assist in linking up the right of the A. & N.Z. troops with the 3rd L.H. Brigade. The 42nd Division was to advance on the line Canterbury Hill to Mt. Royston to the Hod el Enna, and drive back any opposition to the advance of the mounted troops; only two brigades of this division were ready to move, the 126th Brigade remaining in reserve at Pelusium Station. A part of the 52nd Division was ordered to act in a similar manner toward Mt. Meredith. The 52nd Division was also to prepare for an advance eastward toward Abu Hamra; they were not to undertake this move without further orders from Section Headquarters.

At daybreak on August 5 the 8th Scottish Rifles, having passed the night just short of Wellington Ridge, began their advance with the 7th A.L.H and the Wellingtons on their right. The 7th S.R. during the night had brought 16 machine and Lewis guns to a position whence they could sweep the crest and reverse slopes of the ridge, thus covering the attack. The Turks had made a hard fight, but daylight made them realize that they had been abandoned, and the long line of bayonets before them was too much for exhausted nerves to endure. A white flag was hoisted and a forest of arms held high. The 8th S.R. received the surrender of 864 men, while the Light Horse and the Wellingtons, as they breasted the rise a few minutes later, received a number more. Prisoners to the number of 1,500 were taken in this neighborhood. Pinned to the ground by fire from the works further north, other bodies of Turks were kept from joining the general retirement, and another 119 surrendered at 6 a. m. to the British in Work 3. Most of the prisoners were in a pitiable state of exhaustion; they had had no water for a long time.

It had become apparent by this time that the enemy was in full retreat, and at 6:30 a. m. General Chauvel was ordered to take command of all mounted troops and move in pursuit. Due to the necessity for collecting these scattered troops the advance did not begin until 10:30, and that of the infantry was further delayed.

It is not necessary to follow this pursuit; it continued until 5:30 p. m. on August 9. The Battle of Romani was over, and must be considered a highly creditable British victory in view of the surrounding conditions. It marked the end of the campaign against the canal. Although the main body of the Turks had escaped—which was highly regrettable—the enemy had suffered a heavy defeat. Even though Constantinople might have projected further attacks, none was ever carried out. Besides completely failing to reach his objective, the enemy lost nearly 4,000 prisoners, a mountain battery, 9 machine guns, 2,300 rifles and a million rounds of ammunition, 100 horses and mules, 500 camels, and 2 complete field hospitals, besides destroying great quantities of his stores during his retreat. The total number of Turkish casualties was placed by the British at 9,000. In contrast to these heavy losses, the British casualties numbered only 1,130, with a low proportion of killed, the latter principally in the A. & N.Z. Mounted Division, and a very small list of missing, the latter amounting to only one officer and 45 men.

Considerable credit must be accorded Colonel Kress and his chief of staff, Major Kadri Bey, for the efficient manner in which they conducted the Turk's retreat, especially in the withdrawal of his heavy guns. The devotion of the Turkish troops and their extraordinary staying powers during their march through sand and heat is an example which excites admiration.

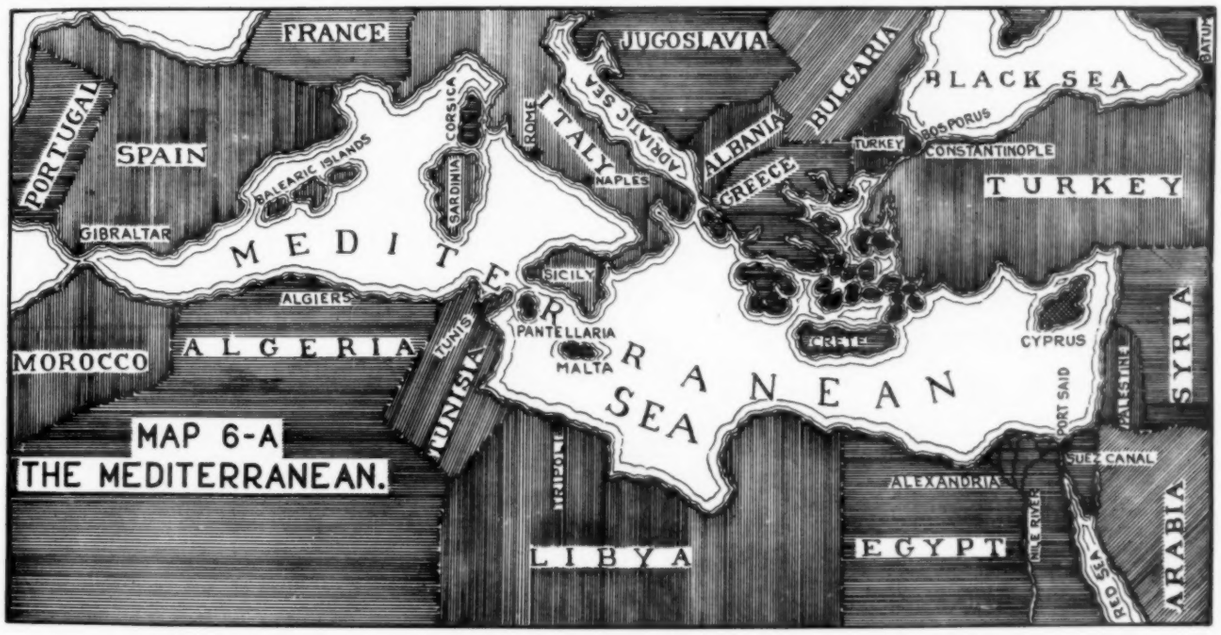
THE Suez Canal serves as the gateway of commerce between Europe and the eastern countries; should this commercial artery be closed communication with the East would have to be accomplished by way of the Cape of Good Hope or by passage through the Panama Canal. The possible closing of the canal, should the world again witness a war of major proportions, has often been the subject of discussion. The canal company claiming it must, according to the Constantinople Convention of 1888, and as maintained by Article 282 of the Versailles Treaty, remain neutral and open to all traffic.

The canal directors, of whom 21 are French, 10 are English and one is a Hollander, no doubt visualize huge profits accruing to them providing the canal is kept open during a major European or African conflict. There is, however, no doubt in my mind in such a conflict that the stronger party, provided he possesses a fleet commensurate to the task, will close the canal to its antagonist's vessels and to all neutral shipping carrying supplies or foodstuffs to the latter.

This would effectually prevent the delivery of materials so urgently required during war to any fleet having its base, or its assembly, in the Mediterranean, but unless the Bosporus also were closed by the stronger party, the enemy could possibly obtain oil, so necessary for his fleet, from Batum on the Black Sea. Such conditions would certainly lead to a naval war in the Mediterranean. This also holds good for the Straits of Gibraltar, and if the latter is closed both antagonists would be bottled up in this sea. It is evident this closing party would have access to supplies at the eastern end of the sea via the canal, and at the western end through the Gibraltar Straits, consequently the weaker party would have to surrender or accept battle.

The fortifications at Malta at one time commanded the central passage in the Mediterranean, but recent years have witnessed quite some changes here; another power has fortified the island of Pantellaria, opposite Tunis, (see Map 6-A), thus greatly reducing the effectiveness of Malta.

Should the canal be closed to the weaker party the latter might attempt to destroy the canal to cut off supplies intended for his antagonist. Air forces would no doubt assume a major part in such an attack, provided air bases were located near enough to the canal. This menace could, of course, be met with a counter air force supported by sufficient antiaircraft artillery to command the skyways for the 100 miles of the canal's length.



MAP 6-A
THE MEDITERRANEAN.

An attack on the canal by land forces would depend upon the alignment of the neighboring states. The canal lies entirely within Egyptian territory, consequently unless this state were allied with the attacking party the subjugation and occupation of Egypt would first be necessary. This same measure applies in case the attack should come from the east. During the World War Turkey was allied with the Central Powers. What happened when Turkey made its attack on the canal is depicted in this article.

IN 1898 the U. S. S. OREGON made her memorable voyage from Seattle, around Cape Horn, to Santiago, Cuba, where, after burning her own wood-work to maintain steam, she arrived in time to participate in the destruction of the Spanish fleet. Five years later we were negotiating with the Government of Colombia in an effort to acquire the right to construct the Panama Canal to avoid any such further "Oregon" voyages. During these negotiations the Colombian department of Panama revolted, set up an independent republic, and the latter was recognized by the United States ten days later. Five days after this recognition a treaty, which granted us the rights we had sought from Colombia, was negotiated and the Panama Canal was thus transposed from a paper stage to one of reality.

The Panama Canal serves all nations in the needs of peaceful commerce, hence in the words of the President Franklin D. Roosevelt, "The United States is, therefore, a trustee for all the world in its peaceful maintenance." We have maintained this trusteeship since the opening of the canal, but its acquisition has also given the United States a military problem which extends further afield than the limits of the canal itself. Its defense starts at the "cross roads of the Pacific", the Hawaiian Islands. It is not intended in this article to do more than indicate this relationship, leaving the results due to the possible loss of these islands to the conjecture of the reader.

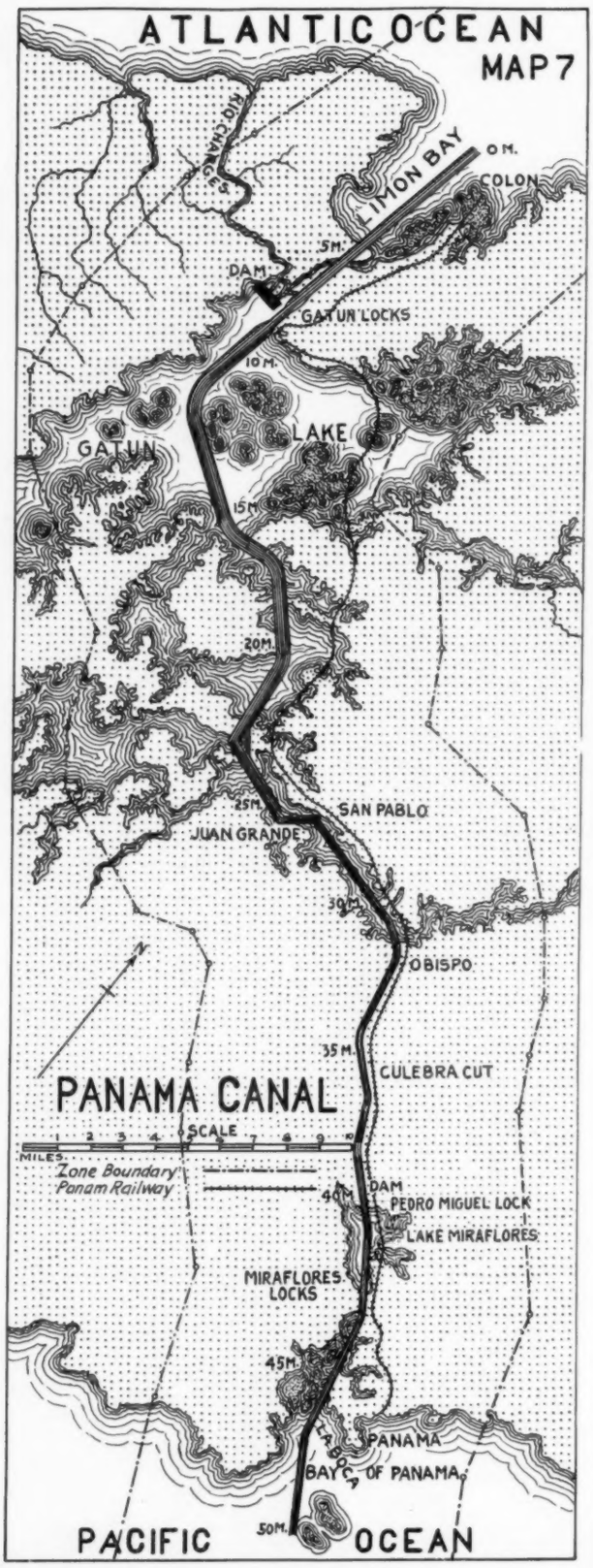
The military conditions surrounding the Panama Canal are entirely different from those at Suez. We have no sandy wastes confronting us, but a dense jungle which, as General Goethals is reported to have said, "is the best defense of the canal." Given the time and opportunity, however, even this defense vanishes, as was exhibited recently when a Coast Artillery regiment, with all its impedimenta, announced it had cut its way through the jungle and had marched from ocean to ocean.

To make a landing in force in the Canal Zone it would be necessary for the enemy to gain complete control of the sea; the roads through the jungle present an almost insurmountable problem to the invader, since they are very narrow and are not built for heavy traffic. For example, the road from Panama westward passes through a succession of heavy, dense jungles and forms a series of "bottle necks" at each of which a few machine guns would be capable of delaying invading forces of any size for days, and perhaps of even stopping them altogether. These roads could also be readily bombed from the air and thus so thoroughly saturate the terrain with lethal gases that any such move on the canal would be impossible.

There are, however, several points in the canal which are quite vulnerable from the air. They are the dams and locks as well as the Culebra Cut. The dam at the Gatun Locks controls the flood waters of the Chagres river and other streams and closes off one end of the Gatun Lake, the other end being closed by the dam in the valley of the Rio Grande at the Pedro Miguel lock. These locks are also vulnerable to an explosion on a ship within the lock.

The world contains many desperate men who, for money,

will take any risks, or who from patriotism would gladly sacrifice their lives to accomplish a national enterprise. It is true that in the event of war no ship would be allowed to enter the canal before being subjected to a minute inspection, but in spite of this it would not be impossible to conceal in the cargo



sufficient high explosive, the detonation of which would do immense damage to the locks or the Culebra Cut. Considerable time would be required to repair the locks, and the explosion at the Cut, if heavy enough, would probably dislodge countless tons of earth from the sides of the ravine and thus close the canal across its entire width at that point. Not only would such a landslide bring many tons of earth into the canal, but the bed of the latter would probably be forced upward by the terrific pressure produced in the surrounding hills. In either case the canal would be blocked to traffic for a considerable period, and this at a time when its open fairway should be ready for the passage of the fleet.

Our Navy is not of a size which could maintain the necessary fighting strength in both the Atlantic and Pacific at the same time, and even though the war should be fought in one or the other ocean, the explosion might be timed to prevent at least a portion of the fleet reaching the waters where its presence would be urgently required, hence such blocking of the canal would at once introduce a problem with a questionable solution.

Time would not be allowed us to bring a fleet of "Oregons" to the disputed sea by way of Cape Horn, since any war of the future will not be fought with a Spain, but rather with a people more prepared for such contingency than was our unfortunate opponent in 1898.

The defense of the canal, exclusive of the difficulties provided by the surrounding jungle, will, in case of an attack by sea, depend upon our naval forces, assisted by the land batteries should the enemy be permitted to come within the range of these guns, but an aërial attack must be met in the air before the enemy reaches the canal. Should the enemy planes break through the aërial defense and reach the canal, our principal defense would naturally revert to the antiaircraft batteries which, although they could put up such a barrage through which it would seem impossible to pass, could not prevent some one or two of the enemy, coming from a direction which might not be under proper observation during the heat of the fight, from planting their "eggs" at points where the resulting damage would be lamentable. Under these conditions *too much attention can not be given to the Panama Canal defenses.*

The cause of the Allies might have taken quite a different turn had the Turks been able to wrest command of the Suez Canal from them, and history as we read it today might have presented a page which would not be pleasant reading.

In spite of all the pacificism existing in the world today, the millenium so earnestly desired by all does not as yet confront us. The failure of disarmamant conferences shows that the world, or at least its politics, is not as yet prepared to make plowshares and pruning hooks out of the steel necessary for the defense of the nation, hence preparedness should ever be our daily watchword, and such points as the Panama Canal which, if not properly prepared, presents a potential danger of immense magnitude which should be given every possible consideration in an effort to make it as impregnable as human skill and bravery can accomplish.

Success or failure at the Panama Canal, or its Hawaiian outpost, means more to the future of the United States than the average man can realize. Let us hope we will be spared the necessity of defending this ditch across the Isthmus of Panama. Should the necessity arise, let us be in a position to know that we have done everything humanly possible to retain its possession. (*This concludes Colonel Wagner's text.*)

Ordnance Day, 1935

The Association's Noteworthy Annual Meeting

"ORDNANCE DAY" is the name which tradition of the past sixteen years has associated with the annual meeting of the Army Ordnance Association at the Aberdeen Proving Ground, Md. The record of Ordnance Day 1935 begins not on October 3rd when the usual trials and demonstrations took place at the great ordnance testing station but rather the night before. On October 2nd the annual dinner and business meeting of the Association were held in Washington, D. C., at the Mayflower Hotel. Two hundred and twenty-eight members of the Association and of the American Society of Mechanical Engineers were in attendance including many leading figures of the industrial preparedness cause. They had assembled primarily to pay honor to the three men who had been selected by the Association's Committee on Award to receive the gold medal for meritorious ordnance service. The medalists were Hon. Newton D. Baker, Secretary of War 1916-1921; Hon. Bernard M. Baruch, chairman of the War Industries Board 1918; and Col. Rogers Birnie, U. S. Army Retired. The citations accompanying the respective presentations were published in the last issue of ARMY ORDNANCE. The addresses delivered by the medalists at the meeting appear elsewhere in this issue. The medals were conferred by Brig. Gen. Benedict Crowell, president of the Association, who presided at the meeting. Lieut. Col. LeRoy Hodges, chairman of the Committee on Award, presented the candidates and read the citations.

In the opinion of many members and guests, this gathering eclipsed both in importance and enthusiasm any in the long history of the organization. The addresses—all of them—were among the most enlightening that have ever been delivered during the history of the industrial preparedness movement. Considering the eminence of the speakers, their experience and public service, no more timely pronouncements have ever been made on the fundamentals of our national defense. (All the addresses at the meeting, which are published in full on pages 139 to 154 in this issue, are being reprinted in pamphlet form, copies of which may be had upon request.)

SEVENTEENTH ANNUAL MEETING, THE ARMY ORDNANCE ASSOCIATION, OCTOBER 2, 1935

Seated at the speakers' table (left to right): Col. C. M. Wesson, Ord. Dept.; Hon. Swagar Sherley; Brig. Gen. John Ross Delafield, Ord. Res.; Rear Adm. H. R. Stark, U.S.N.; Col. Rogers Birnie, U.S.A. Ret.; Hon. Newton D. Baker; Brig. Gen. Benedict Crowell, Ord. Res.; Hon. Bernard M. Baruch; Hon. Patrick J. Hurley; Maj. Gen. William H. Tschappat, Ord. Dept.; Col. Frederick H. Payne, Ord. Res.; Lieut. Col. LeRoy Hodges, Va. N.G.; Maj. Gen. Samuel Hof, U.S.A. Ret.; Brig. Gen. John H. Rice, U.S.A. Ret.; Hon. Chester C. Bolton and Col. James L. Walsh, Ord. Res.

OCTOBER 3rd was Ordnance Day at Aberdeen. Ordnance cohorts from far and wide journeyed to the Proving Ground for the program of tests. They came by train, by plane and by private automobile. The group which had attended the dinner meeting the evening before traveled, most of it, by special train from Washington. Special trains were also operated from New York and Pittsburgh. In addition, nearly 1,500 automobiles entered the Proving Ground during the morning and by fairly accurate count some 6,000 men were on hand when the opening gun was fired. Due to safety requirements children under sixteen and ladies were not admitted. The weather was ideal—a typical October day in Maryland. Assembled about the 16-inch gun at 10:30

a. m. were officers of the defense services of the United States, industrialists, executives and engineers of American industry. There too were the civilian chiefs of the Ordnance districts and their associates who had assembled in Washington the previous day for their annual conference on industrial mobilization. Led by the Assistant Secretary of War, Hon. Harry H. Woodring, and ranking officers of the Army and Navy, the group witnessed a program of current tests of ordnance equipment similar to those which have characterized Ordnance Day from the beginning.

THE morning program began at the plate range with a brief address of welcome by the Commanding Officer of the Proving Ground, Col. C. M. Wesson, Ord. Dept., U. S. Army. Colonel Wesson had arranged Ordnance Day functions in previous years and is well known to all visitors to the Proving Ground for his hospitable and efficient direction of these great exhibitions. The first test on the program was the firing of the 14-inch gun mounted on the disappearing carriage and was followed by the successor of this weapon, the 16-inch gun mounted on a proof mount. At the antiaircraft range the 62nd Coast Artillery (AA) Regiment conducted antiaircraft firings against sleeve targets towed by airplanes. Equipped with the latest design of mobile antiaircraft artillery the regiment put on a splendid demonstration of speed and accuracy in this difficult artillery problem. The 3-inch antiaircraft guns were used firing a 12.7-pound projectile at a muzzle velocity of 2800 f.s. The vertical range of these pieces is 9,700 yards; the horizontal range is about 14,200 yards. They have a rate of fire of 25 shots per gun per minute. The fire-control installation consists of the stereoscopic height finder for measuring the altitude of the target, and the director for plotting the target's position. The latter instrument, often referred to as the "robot", is a tribute to the engineering skill and genius of the coöperative effort of American industrial and military engineers.

After demonstrating latest types of antiaircraft pyrotechnics, demolition bombs of the 300 and 2,000-pound types were tested illustrating the attack on ground and water targets by bombardment planes. Exhibitions of the use of smoke screens were given by the Air Corps and Chemical Warfare Service when three attack planes laid a smoke blanket. Following these exhibitions the visitors were taken to Phillips Field, the new and splendidly equipped airdrome at the Proving Ground, where aircraft armament including machine guns, demolition and fragmentation bombs and various types of airplanes were on display. Here a wingless autogiro was demonstrated.

THE afternoon program following the luncheon period was conducted at the Main Front. During luncheon guests were privileged to visit the Ordnance Museum with its great display of foreign and American ordnance matériel. The Chemical Warfare Service displayed in the museum the latest type of chemical mortar and other pieces of equipment developed by that service, and nearby a mobile ordnance machine shop, equipped to perform repair work in the field, was in operation. At 2 p. m. a demonstration of tactical combat flying by attack and pursuit planes was given by the Army Air Corps. This display of precision by the intrepid personnel and dependable equipment of the Air Corps thrilled the thousands who observed it. Next began a series of demonstrations of small arms matériel, artillery ammunition and mobile artillery. This was followed by a comparative exhibition of old and new developments in the field of automotive fighting and tactical vehicles. The vehicles passed slowly along the front while the announcer described the features of each. Not to be outdone by the Havre de Grace race track which is near the Proving Ground, a race between tactical vehicles was scheduled. A scout car of latest model and the armored car recently developed by the Ordnance Department were pitted against each other demonstrating some of the gruelling tests to which these vehicles are put in order that weaknesses may be disclosed before the design is adopted by the Army. Two tanks also raced over the course to indicate the severe obstacles ordance equipment must overcome before it can be classified as standard.

The program was brought to a close by a simulated military attack on a fortified position to demonstrate the tactical uses of tanks. While the problem was a sketchy one at best, the machines negotiated barbed wire and ravines finally to demolish the temporary building which had been "defended" by a loyal band of sharpshooters until the walls and roof were plowed down by the tank attack. At 4:30 p. m. the program had been brought to a close and the thousands took their departure enthusiastic that Ordnance Day had been resumed again and apparently satisfied with this opportunity to observe ordnance equipment in actual operation.

DESPITE the painstaking plans which had been made for handling so great a volume of traffic and to provide for the comfort and convenience of so many visitors, there were some disappointments. However, the traffic jams due to the inherent layout of the establishment and the inability of concessionnaires to serve sufficient food during the luncheon period did not dampen the ardor of old friends who realized that the Proving Ground is designed primarily for scientific tests and not for the accommodation of thousands of visitors. In every detail the program of tests and demonstrations was superbly planned and splendidly executed. For this Colonel Wesson and his staff of assistants are to be congratulated most heartily. Likewise ARMY ORDNANCE takes this means to thank publicly the Secretary of War, Hon. George H. Dern, who authorized the resumption of Ordnance Day, and Maj. Gen. William H. Tschappat, Chief of Ordnance of the Army, who personally coöperated in arranging the tests and demonstrations.

To record the names of all the distinguished guests who attended both functions of the Seventeenth Annual Meeting would be quite beyond the limitations of space in these pages. Suffice it to say that the Washington and Aberdeen gatherings of 1935 were an earnest indication of three very stimulating factors for the national defense of the United States. Industrial preparedness, which was the motif of both functions, is a live, well established and progressing national defense philosophy. Sound leadership as evidenced by the addresses at the Washington meeting is indicative of a healthy outlook at a time when consistent efforts are being made to undermine and destroy our ability to produce ordnance in time of emergency. Last, but not least, the opportunity to observe the engineering characteristics and maneuver of America's military armament—the only purpose of Ordnance Day—is appraised highly by the industrial and professional elements of our people who know the significance of the Association's claim that industrial preparedness is one of our strongest, and surely one of our sanest, guaranties of peace.

ARMY ORDNANCE

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THE ARMY ORDNANCE ASSOCIATION
WASHINGTON, D. C.

NOVEMBER-DECEMBER, 1935

Month by Month

WHEN Gen. Douglas MacArthur relinquished the high command of the Army after five years of notable service to head the Military Advisory Commission to the Philippines, Gen. Malin Craig, distinguished soldier and administrator, was appointed Chief of Staff of the Army. ARMY ORDNANCE felicitates General Craig and congratulates the Army and the country on their good fortune. He assumes command at a crucial period in the progress of the military service and brings to his office a degree of leadership which has been proved on the field of battle as well as in the councils and direction of the Army. Of all the available commanders none has greater qualifications than General Craig. His selection is a happy omen for the advancement of the Army during the next four years.

GEN. MALIN CRAIG, CHIEF OF STAFF

We share the opinion of Gen. John J. Pershing who in commenting on General Craig's fine record in line and staff in a cablegram to the *Army and Navy Journal* said, "He possesses the rare gift of common sense and has a delightful personality. The Army is to be congratulated upon his appointment."

No finer tribute has ever been paid an Army Officer than that of Maj. Gen. James G. Harbord, U. S. A. Retired, who wrote a special tribute to General Craig in the *Journal*. We take the liberty of quoting from General Harbord's account because it epitomizes the service and capabilities of the new Chief of Staff in the words of one whose devotion to the Army is a guiding star for all Americans these days. General Harbord wrote:

"Upon graduation from West Point he was assigned to the Infantry. But he sought the arm of his boyhood memories, and in three days less than a month he was transferred to his father's old regiment, the 6th Cavalry. He followed the guidons of the cavalry as long as he was a regimental officer, with the exception of a brief period in 1917 when he carried the title of a Lieutenant Colonel of Field Artillery. During the thirty-seven years since his graduation he has served practically wherever our flag has flown. Beginning with the Santiago Campaign in Cuba, his foreign service record includes China in the Boxer Rebellion, four different tours of duty in the Philippines and the command of the Department of Panama. He was in France from late 1917 to November 12, 1918, and then went with the Third Army to Germany. In the continental United States he has served all over the map, his last important command being the 9th Corps Area on the Pacific Coast where he has been since 1930. This last included incidentally the control of more CCC men than there are soldiers in the United States Army.

"No officer of his time saw more varied service than he in the twenty years between his graduation at West Point and our entrance in the World War. Twice an aide-de-camp, first to the stern and unbending Thomas H. Barry in the Philippine Insurrection, and later in its closing days to that dashing cavalryman General J. Franklin Bell. He was to serve General Bell once more in the same capacity eleven years later at San Francisco. He was under Chaffee at the storming of Peking in the relief of the Legations beleaguered by the Boxers in the summer of 1900. In his rise through maturity he held every regimental staff position for which his rank made him eligible.

"It was a great accumulation of soldier experience that he brought with him when in the summer of 1917 he became Chief of Staff of the 41st Division under Maj. Gen. Hunter Liggett. His new commander was an outstanding veteran with great qualities of mind and heart, and his chief of staff admired and respected him. They were not to be separated again, except for short intervals, until the Third Army disbanded on the banks of the Rhine, and Liggett sailed for home in July, 1919. The 41st Division had been broken up for replacements on arrival in France, and Liggett and Craig went together to organize the First Corps of the American Expeditionary Forces in January, 1918. It served in the Toul Sector, in the Second battle of the Marne, in the reduction of the St. Mihiel Salient, and in the forty-seven days struggle in the Meuse-Argonne. In October, 1918, Liggett's promotion to head the First Army, gave Craig a new Corps Commander, that excellent soldier Joseph T. Dickman, who commanded the First Corps during the last weeks of the Campaign. Craig, now became a Brigadier General in the National Army, continued as its Chief of Staff until the Armistice. When the Third Army was formed on November 12, 1918, Dickman and Craig joined it together and marched with it to the Rhine as Commander and Chief of Staff. After a few months General Liggett relieved Dickman at Coblenz and took over command of the Third Army, and Craig found himself again under his old commander.

"No textbook can fix the exact duties of a Chief of Staff of a fighting unit. There is much coördinating authority inherent in the position, exercised as it is in the name of his General. His authority in principle flows from and is measured by the confidence reposed in him by the Chief in whose name he gives orders. That General Craig satisfied two as exacting and competent chiefs as Liggett and Dickman during the trying days when the First Corps was bearing the brunt of the St. Mihiel attack, and the long struggle against the last-ditch stand of the Germans in the rugged forest of Argonne and from the dominating heights between the Aire and the Meuse, leaves no doubt as to his quality as a soldier. He was the continuing strong influence throughout the Corps.

"He was awarded the Distinguished Service Medal, with this citation:

'For exceptionally meritorious and distinguished services. He served in turn as Chief of Staff of a division, a corps and an army, in each of which capacities he exhibited great ability. His personal influence, aggressive and untiring efforts were repeatedly displayed in the operations of the First Corps in the vicinity of Chateau Thierry, on the Ourcq, and the Vesle, during the St. Mihiel and Meuse-Argonne Offensives.'

"The same eminent services brought him recognition by decorations from France, Great Britain, Belgium, Italy and Ecuador.

"When the troops came home General Craig on August 5, 1919 reverted to his regular grade of Major and took it with a smile. On the passage of the National Defense Act in June, 1920 he became a Colonel, and a Brigadier General the following April. In July, 1924 he was appointed Chief of Cavalry with the rank of Major General. He filled that important place until March, 1926 when he was relieved at his own request for line duty. He was at once made a Major General. By his recent selection for Chief of Staff of the Army he becomes a four-starred General.

"We were Captains together in the old First Cavalry, and were never very far apart in France. I know the affection and esteem with which he is regarded by those who have served under and over him. He radiates leadership and team work. He has mixed with all classes of men in all kinds of circumstances, and knows how to get along with people. He has been no balancer of cups at pink-teas, and no squire of dames, and, to use a soldier's expression, has 'cooled no coffee' in his crowded years. With a developed or inherited sense of humor, he is always able to see the other fellow's viewpoint. He has that invaluable attribute for success, a sense of proportion. He is sympathetically modern in his outlook on military matters, He knows what is worth while. He fights for no non-essentials. He reaches for no one without getting him. He will organize, consolidate and modernize in every way for the Army and the country, what his brilliant predecessor secured for it.

"He faces many problems. The brilliant galaxy of Major Generals from among whom he was selected, Nolan, W. D. Connor, Fox Conner, McCoy, Malone, Drum, Parker, Bowley, Moseley, Simonds,—with Douglas MacArthur and others, are the last of the young group who as general officers fought under Pershing in the Great War. When he leaves office, all of them except MacArthur and Drum will have preceded him to the retired list. The patriarchal peace system of promotion by seniority does not bring such men to the top in their active years. Upon the selections of General Officers, whom he recommends to the Secretary of War during his term as Chief of Staff, will depend the efficiency of our Army for many years after his time. The pressure of still-existing depression, and the hardship of excessive taxation will force efforts to reduce the Army at no distant day. He will have to struggle to keep the numbers of which he now becomes the guardian for his country.

"His comrades of forty years of service in sunshine and storm hail his selection on merit, and wish him all the high success which his character and attainments promise. The Army and country are fortunate in having him for our Chief of Staff."

To this fine tribute to the new Chief of Staff by the great Harbord Army Ordnance adds its sincere, hearty acclaim.

Infantry Mobility and Fire Power

EXPERIMENTS and tests upon which conclusions for permanent application will be drawn are being conducted by the 28th Infantry at Fort Benning, Ga. The trials look toward greater mobility and fire power for a new regimental organization of the Infantry. According to recent War Department announcement, the significant feature of the new proposal is the separation from Infantry battalions of their machine gun companies and the segregation of these latter, within each regiment, as a consolidated unit in whch the mortar also will be included. There will exist in the Infantry regiment, under this arrangement, three rifle, or light, battalions and one supporting, or heavy, battalion. The light battalion will have no weapon not readily carried by a marching soldier, while the transportation provided for the heavy unit will be speedy motor vehicles.

"An anticipated result of this regrouping is a marked increase in mobility," in the opinion of the Department. "Front line battalions, unincumbered by horse and wheeled transportation, will be able to use motor vehicles for long and rapid marches. On the battlefield their movement will be likewise facilitated. This general regrouping of Infantry weapons within the regiment has been made possible by the improved characteristics of modern Infantry weapons. So long as available weapons possessed no greater efficiency than those of the World War period, the need for adequate fire power within the front line battalion required the assignment to it of a strong unit armed with water-cooled, relatively heavy, machine-guns. But now, armed with modern semi-automatic rifles and newly developed machine guns of very light weight, the battalion, even after discarding its old machine-gun company, will possess a fire power far greater than that heretofore obtainable. Assuming that results will verify these anticipations in increased mobility and fire power, the combat effectiveness of the Infantry regiment will be multiplied."

Ordnance Marksmen

WHEN the Ordnance Reserve Officers of the New York Metropolitan District held their annual dinner on October 25th opening the 1935-1936 training season (see page 179) honors were conferred—not for skill in production or manufacture of ordnance but quite appropriately—for proficiency in use. This was a happy omen, for marksmanship is part of the soldier's qualification.

At the close of his remarks on the Ordnance Field Service General Shinkle awarded the Col. James E. McNary Trophy founded by Colonel McNary for award to the winning team in caliber .22 rifle competition in the Corps Area. Colonel McNary was among the honor guests at the dinner. Each year teams from various branches of the Corps Area compete for the McNary Cup which was first offered in competition in 1927. The Ordnance Reserve team was victorious again this year as it has been on two previous occasions. The team for 1935 was composed of the following members, all officers of the Ordnance Reserve: Capt. Lawrence J. Corsa, Lieutenants Joseph C. Fitzgerald, Clyde Whitlatch, William Spinrad and Oswald Braun. Captain Corsa was awarded a gold medal for the highest score and the other members of the team were presented silver medals.

Preparedness in Perpetuity

An Editorial

THE time is appropriate to give some serious thought to ways and means of guaranteeing industrial preparedness for the United States in perpetuity. Industrial preparedness is just what its name and its brief mandate in the National Defense Act imply—no more, no less. It does not favor an armament race, it has nothing to do with war scares, it is not and never should be other than a very necessary constructive influence. Certainly it does not stand for any kind of jingoism—crackpot or otherwise. It presupposes a guaranty of education on the most vital of all questions connected with the permanent welfare of our country; i.e., the ability to produce American armament in kind and in quantity whenever American armament may be needed. Industrial preparedness does not attempt ever to say when that time may be; it merely deduces that the time *may come* simply because it *has come* quite regularly during our 159 years of nationhood. When that time has come it has always found the American people sadly deficient not only in actual arms but in the knowledge required to produce them. We have always had to start our program of technical education *after war began* and we have blundered through every time at terrific cost in blood, time and money. By the providence of God our Army and Navy have emerged victorious always but too often by the skin of their teeth. The time is appropriate—indeed it demands—that serious thought be given and some necessary action be taken on this urgent subject. Let us look the issue squarely in the face and let us do something about it now! Let us analyze the problem here and suggest a way out.

AMONG our 125,000,000 people there are all sorts of very worthy organizations pledged to some kind of betterment of the commonweal in one form or another. Many of these organizations are commendable; many are performing highly valued service. Some are concerned with our economic and social advancement, others with our religious and charitable progress, still others with our educational and professional advancement. Many of these are invaluable because essential; some are sheer waste because unnecessary; only a few are downright subversive and should have no place in our scheme of things.

Strange to relate there is but one organization in the United States devoted exclusively to industrial preparedness. That organization is the Army Ordnance Association, the publisher of this Journal. For sixteen years the Association has been in the forefront of the thin line of American citizens who give more than a snap of their fingers for industrial preparedness—the most vital, as we have said, of all phases of our national defense. What the Association has been doing during these sixteen years is a matter of public record. At least it has kept alive an infinitesimally small amount of general interest in this all-absorbing problem. Some friends have been kind enough to say its work is of the first rank; others are firm in their belief that without the Association's effort we would already have returned to that customary state of abject ignorance of our armament needs to which we have slipped after every great military emergency in our history. Except for a handful of professional officers of the Army whose duty it is to study and plan our national conduct of a major war from the viewpoint of producing needed armament in emergency there is no other civilian agency to sponsor this cause exclusively. In any event, the Association has done its best with its very meager equipment. For sixteen years it has put its membership objective at 5,000. It has never reached 4,000 and today the active membership stands at less than 3,000. The Association is not subsidized, it receives no government grant, its entire income today, as always, is derived from membership dues, interest on its small savings and advertisements in this Journal. Its highest annual income was reached in 1931 when receipts from these sources were $25,369.86. Its income for 1934 from all sources was $17,934.84. For several years a decade ago the organization was able to carry on its activities with a slight excess of income over expenditures. This surplus was accumulated and today the investment account stands at $21,338.75 which includes a gift of $822.50 presented by the late Col. William C. Spruance, formerly a vice-president of the Association. For several years the association has operated at a deficit.

It should not be necessary to state that at no time in the history of the organization have any of its elected officials received any remuneration whatsoever; indeed for years they have carried on at considerable out-of-pocket expense to themselves. The organization has been somewhat careful in its spending of money. At no time during the past sixteen years has its staff exceeded three paid employees who carry on all the ramified activities of a nation-wide membership organization and attend to the editoral and circulation duties connected with this Journal.

This, then, is the complete story of the one organization in the country devoted to one of the greatest public-spirited enterprises connected with the common good. Its record is an open book. Despite pot-shots by radical groups and demagogues it holds its head high and its purpose clear. It carries on, as it began in 1919, with no commercial interests, no political alliances and no religious affiliations. And it does so with logical pride that it has been able to accomplish something never before done for the national defense, even though that something be a mere fractional part of what it might be or, more accurately, what it should be.

THEREFORE we believe the time demands, after sixteen years, that the Association undertake a second phase of its life as an institute, highly endowed and financially secure against the needs of the future, certain against amateurish, unrealistic attitudes and professionally pledged to keep alive a knowledge of the design, development, production and supply of military armament for war emergency as a guaranty of peace. The proposal has much logic in back of it and should meet with the enthusiastic support of our members.

Why, one might ask, should so vital a function be left to the whims of fortune as to whether it will be performed effectively or not? Judged by other standards and in the light of support which goes to other enterprises two cases of recent months are in point. One of them is the Foreign Policy Association, a splendid group of enthusiastic students

of international relations under the leadership of Dr. Raymond Leslie Buell which is doing a great amount of constructive work in the field of popular education on questions of diplomacy, economics and international affairs. According to the annual report of the Association for 1934 its high point in membership was reached in 1931 when 12,505 persons were enrolled. In March, 1935, the membership was 12,358. The interesting commentary on that Association is its financial situation as disclosed in the report. In 1930 the income of the Association reached its highest figure, $174,000; its lowest, in 1932, was $128,000. In 1933 the Association's income increased to $138,000. The budget of expenditures for 1934 was $129,000; for 1935, $135,000. But, whereas the Army Ordnance Association derives its income from membership mostly, approximately only one-third of the Foreign Policy Association's income is derived from membership dues, subscriptions and sales of publications. Two-thirds of its income are contributions. In 1934 the Rockefeller Foundation contributed $25,000 to the Foreign Policy Association's budget, the Carnegie Endowment for International Peace $25,666; the New York Foundation $5,000, and the Twentieth Century Fund $3,500. In addition to these, the Rockefeller Foundation appropriated $7,500 for the purpose of publicizing the question of economic nationalism and $35,000 for the Association's Cuban Commission.

The other case comes to light in a press announcement in the *Washington (D. C.) Daily News* of November 7th as follows:

"An anonymous $50,000 contribution by a Washington woman to the National Council for the Prevention of War, to be used in the cause of world peace, was announced yesterday by Frederick J. Libby, executive secretary of the council.

"The money will be used to intensify the campaign recently launched to obtain 500,000 purchasers of 'peace bonds.'

"Libby said further: 'This generous gift reveals the donor's vision of the paramount importance of peace. It is bound to stimulate other similar donations in this critical period. Insurance against war, which is what our country wants, cannot be had through building more competitive battleships.'"

WITH such benefactions to these organizatoins the funds available to the country's only industrial preparedness organization are a pittance. Mr. Libby received in one swoop for the Council for the Prevention of War sufficient to carry the Army Ordnance Association through two years of its greatest activity. F. P. A. in 1934 received contributions of more than $100,000, sufficient alone to carry the A. O. A. in high gear for four years. Is it unreasonable to suggest, then, to our members who are just as sincere and devoted to an ideal as any can possibly be that some thought be given and some steps be taken to place our only industrial preparedness organization in a position where it can perform its great educational function more effectively, more generally and more lastingly?

The Carnegie Endowment for International Peace, founded in 1910 with a view to "the speedy abolition of international war between the so-called civilized nations," has a capital of $10,000,000. The Rockefeller Foundation, chartered in 1913 "to promote the well-being of mankind throughout the world," has a net capital fund of about $168,000,000. Its operations include an International Health Division and four directorates devoted to the natural sciences, medical sciences, social sciences and humanities. These are but two of the better known foundations; there are countless others to sponsor many types of humanitarian endeavor—not to mention the great educational and religious endowments. But no great national foundation exists for the realistic purpose of preventing war by industrial preparedness or winning a war whenever it shall come! It is well enough to strive for ways and means of preventing war through research and propaganda but it is far more to the point—individually and collectively—that, in addition, stern facts be realized. Wars *have come* even to us who hate them; there is no indication that they are things entirely of the past; they happen when least expected despite highest motives of righteousness and justice. The price paid and to be paid is terrific. Question: Are we not wanting in a sense of values when we allow so great a cause as this to remain so ineffectual by comparison?

Imagine, for a moment, what could be done—and to what great purpose—if an Ordnance Institute, under the auspices of the Association, were endowed with a sufficient grant, the income to be used in perpetuity for one, and only one, purpose—that industrial preparedness shall not die. Membership dues could be reduced to a point where every American citizen who might have a part to play in any future emergency could be enrolled as a member, publications of great and lasting moment would be issued, our professional educational institutions would be represented in our programs, Ordnance history could be written and published, professional meetings could be held regularly, a library and museum—where many of the priceless private collections of arms could be preserved in their entirety—adequately housed in the Nation's Capital, could be established. Industrial preparedness in perpetuity would be guaranteed! These prospects were envisioned at the Seventeenth Annual Meeting of the Association when Lieut. Col. LeRoy Hodges first suggested the endowment of an Ordnance Institute.

Is this a day dream? We doubt it. Day dream it might have been only seven years ago. But much water has gone over the dam since then. In the flood, many old institutions have had their foundations beaten and buffeted almost to the point of collapse. None has been attacked, misunderstood, misrepresented, villified, condemned more than industrial preparedness. But it has stood its ground, its head high, its anchor to windward. Being a problem—one of the nation's greatest—unwitting mistakes have been made at times in its solution. But its necessity is all the more sure, its surety all the more necessary. Its place in our national scheme of things, if we are to continue to be what we are, is essential. The question to be answered by members of this Association comes down to this: Is so great a cause to go on with only a small fraction of its responsibilities able to be met or will that cause be championed? Will we, members of the thinning ranks of those who lived through the World War and who experienced the lack of industrial preparedness, see this great public cause eventually die of malnutrition or will we, in the spirit of our fathers who gave their all for life, liberty and the pursuit of happiness, establish the one means of guaranteeing these blessings for ourselves and our posterity—preparedness in perpetuity?

Association Affairs

REGULAR ORDNANCE OFFICERS AND THEIR STATIONS

THE following list and directory of regular officers of the Ordnance Department of the Army, with station as of November 1, 1935, is published here as a matter of information for members of the Association:

Adamson, Keith F., Lt. Col., Aberdeen Proving Ground, Md.
Allen, Charles K., 1st Lt., Ordnance School, Aberdeen Proving Ground, Md.
Aman, Joseph L., Capt. Hq. Fourth Corps Area, Post Office Building, Atlanta, Ga.
Andersen, James R., 1st Lt., Selfridge Field, Mount Clemens, Mich.
Armstrong, Donald, Lt. Col., Ordnance Office, Washington, D. C.
Atwood, Frank J., Maj., Aberdeen Proving Ground, Md.
Aurand, Henry S., Maj., (Instructor) Army War College, Fort Humphreys, D. C.
Baird, Arthur R., Capt., Hq., Ninth Corps Area, Presidio of San Francisco, Calif.
Bandholtz, Cleveland H., Lt. Col., Command and General Staff School, Fort Leavenworth, Kans.
Barclay, John A., Jr., 1st Lt., Ordnance School, Watertown Arsenal, Watertown, Mass.
Bardsley, George H., Capt., Fort Bliss, Texas.
Barnard, Clarence, Capt., San Antonio Arsenal, San Antonio, Texas.
Barnes, Gladeon M., Lt. Col., Army Industrial College, Washington, D. C.
Barr, Robert S., Maj., Aberdeen Proving Ground, Md.
Barroll, Morris K., Jr., Maj., Fort Bragg, N. C.
Barry, Edwin F., Capt., Diebold Safe & Lock Company, Canton, Ohio.
Bassett, Ralph H., Capt., Frankford Arsenal, Phila., Pa.
Baxter, Charles R., Lt. Col., Springfield Armory, Springfield, Mass.
Becker, Ward E., Capt., Picatinny Arsenal, Dover, N. J.
Bell, William L., Jr., 1st Lt., Springfield Armory, Springfield, Mass.
Bellinger, John B., Capt., Hq. Sixth Corps Area, U. S. Post Office Building, Chicago, Ill.
Billingsley, John D., 1st Lt., Fort Bragg, N. C.
Blackmore, Philip G., Lt. Col., Fort Benning, Ga.
Boatwright, Walter P., Lt. Col., Honolulu, T. H.
Bodine, Robert N., Lt. Col., Fort Sill, Okla.
Bomar, Ernest C., Major (A. D. C. to Maj. Gen. George V. H. Moseley) Hq. Fourth Corps Area, Post Office Building, Atlanta, Ga.
Booth, Lucian D., Lt. Col. Hq. Second Corps Area, Governors Island, N. Y.
Booton, John G., Lt. Col., Ordnance Office, Washington, D. C.
Borden, William A., Lt. Col., Ordnance Office, Washington, D. C.
Bosworth, Lawrence A., 1st Lt., Ordnance School, Watertown Arsenal, Watertown, Mass.
Bowlin, Roy L., Maj., Aberdeen Proving Ground, Md.
Breen, John J., Capt., Honolulu, T. H.
Bricker, Edwin D., Col., Frankford Arsenal, Philadelphia, Pa.
Bricker, L. Monroe, Major, Fort George G. Meade, Md.
Broberg, Waldemar S., Capt., New York Ordnance District, 39 Whitehall St., New York, N. Y.
Brooks, John A., Jr., Lt. Col., Ordnance Field Service School, Raritan Arsenal, Metuchen, N. J.
Brown, John E., Capt., Aberdeen Proving Ground, Md.
Burgey, Samuel S., Capt., Delaware Ordnance Depot, Pedricktown, N. J.
Burns, James H., Lt. Col., (G. S. C.) Office of the Chief of Staff, Washington, D. C.
Butler, Robert G. Jr., 1st Lt., Aberdeen Proving Ground, Md.
Buyers, Archie S., Lt. Col., Ordnance Office, Washington, D. C.
Cabell, De Rosey C., Maj., Army Industrial College, Washington, D. C.
Call, William A., 1st Lt., Ordnance School, Watertown Arsenal, Watertown, Mass.
Campbell, Harry L., Major, Raritan Arsenal, Metuchen, N. J.
Campbell, Levin H., Jr., Lt. Col., Frankford Arsenal, Philadelphia, Pa.
Capron, Webster A., Lt. Col., Rock Island Arsenal, Rock Island, Ill.
Case, Rolland W., Col., (G. S. C.) Office of the Chief of Staff, Washington, D. C.
Chavin, Raphael S., Maj., Picatinny Arsenal, Dover, N. J.
Christmas, John K., Major, Ordnance Office, Washington, D. C.
Churchill, Harold W., Major, Fort George G. Meade, Md.
Clark, Thomas A., Col., (G. S. C.) Hq. Sixth Corps Area, U. S. Post Office Building, Chicago, Ill.
Clark, Walter L., Lt. Col., Ordnance Office, Washington, D. C.
Clay, Wallace L., Lt. Col., Ordnance Office, Washington, D. C.
Clement, John K., Lt. Col., Picatinny Arsenal, Dover, N. J.
Coffey, John W., Capt., (Instructor) Command and General Staff School, Fort Leavenworth, Kans.
Colby, Joseph M., 1st Lt., Ordnance School, Aberdeen Proving Ground, Md.
Collins, Everett, Lt. Col., Curtis Bay Ordnance Depot, South Baltimore, Md.
Conner, Stephen L., Capt., Ordnance Office, Washington, D. C.
Conway, Harold J., Capt., Barksdale Field, Shreveport, La.
Coombs, Raymond H., Capt., Ordnance School, Aberdeen Proving Ground, Md.
Coupland, Richard C., Capt., Raritan Arsenal, Metuchen, N. J.
Crain, James K., Col. Hq. Eighth Corps Area, Fort Sam Houston, Texas.
Crane, Richard Z., Capt., Springfield Armory, Springfield, Mass.
Crawford, David J., Capt., Watertown Arsenal, Watertown, Mass.
Crawford, James S., Capt., Boston Ordnance District, 2004 Post Office and Court House Building, Boston, Mass.
Crim, Lemuel P., Major, Hq. Eighth Corps Area, Fort Sam Houston, Texas.

Crowe, William J., Capt., Frankford Arsenal, Philadelphia, Pa.
Crump, Ira A., Maj., Rock Island Arsenal, Rock Island, Ill.
Cummings, Emerson L., Capt., Aberdeen Proving Ground, Md.
Custis, Arthur B., Capt., Savanna Ordnance Depot, Savanna, Ill.
Daniels, Robert W., Maj., Frankford Arsenal, Philadelphia, Pa.
Darby, Marshall E., Capt., Hq. Third Corps Area, United States Post Office and Court House, Baltimore, Md.
Davis, Merle H., Capt., (R. O. T. C.) Cornell University, Ithaca, N. Y.
Deitrick, Carroll H., Capt., Ordnance Office, Washington, D. C.
D'Espinosa, William J., Capt., Aberdeen Proving Ground, Md.
Devenbeck, Floyd C., Capt., Graduate School of Business Administration, Harvard University, Cambridge, Mass.
Deylitz, Paul L., Capt., Command and General Staff School, Fort Leavenworth, Kans.
Dillon, Leo J., Maj., Honolulu, T. H.
Donald, Walter G., 1st Lt., Watertown Arsenal, Watertown, Mass.
Drewry, Guy H., Maj., Army Industrial College, Washington, D. C.
Dutton, Carl R., Capt., Ordnance School, Aberdeen Proving Ground, Md.
Eddy, George G., Capt., Honolulu, T. H.
Elliot, Arthur D., Capt., Picatinny Arsenal, Dover, N. J.
Elliott, Stewart H., Capt., Nansemond Ordnance Depot, Portsmouth Va.
Englehart, Francis A., Lt. Col., Hq. Second Division, Fort Sam Houston, Texas.
Erwin, John M., Capt., Ordnance Office, Washington, D. C.
Faymonville, Philip R., Lt. Col., Military Attaché, American Embassy, Moscow, U. S. S. R.
Fletcher, Leslie S., Capt., Rock Island Arsenal, Rock Island, Ill.
Ford, Arthur W., Lt. Col., Hq. Third Division, Fort Lewis, Wash.
Ford, Elbert L., Maj., (Staff) Ordnance School, Aberdeen Proving Ground, Md.
Frank, Selby H., Lt. Col., San Antonio Arsenal, San Antonio, Texas.
Franklin, Edward C., Capt., Springfield Armory, Springfield, Mass.
Freeman, James W., Capt., Picatinny Arsenal, Dover, N. J.
Garton, George G., 1st Lt., Ordnance School, Aberdeen Proving Ground, Md.
Gatchell, Oscar J., Lt. Col., (R. O. T. C.) Massachusetts Institute of Technology, Cambridge, Mass.
Gaugler, Roland L., Lt. Col., Command and General Staff School, Fort Leavenworth, Kans.
Gerber, Theodore C., Maj., (R. O. T. C.) Lehigh University, Bethlehem, Pa.
Gerhardt, William R., Capt., (Staff) Ordnance School, Aberdeen Proving Ground, Md.
Gibson, James A. B., Capt., Fort Knox, Ky.
Gilbert, Fred I., Maj., Frankford Arsenal, Philadelphia, Pa.
Gillespie, Alexander G., Col., Rock Island Arsenal, Rock Island, Ill.
Gillespie, James B., Lt. Col., Picatinny Arsenal, Dover, N. J.
Goebert, Elmer C., Maj., (Design Section) Aberdeen Proving Ground, Md.
Gorton, Walter T., Maj., Ordnance Office, Washington, D. C.
Grum, Allen F., Capt., Rock Island Arsenal, Rock Island, Ill.
Gruver, Earl S., Capt., U. S. Military Academy, West Point, N. Y.
Guion, James L., Maj., Ordnance Office, Washington, D. C.
Haggerty, Robert F., 1st Lt., Watertown Arsenal, Watertown, Mass.
Hall, Dale C., Capt., Ordnance Office, Washington, D. C.
Hamilton, Walter C., Maj., Philadelphia Ordnance District, 808 U. S. Custom House, Philadelphia, Pa.
Haney, James B., Capt., Manila, P. I.
Hannum, Reiff H., Lt. Col., Frankford Arsenal, Philadelphia, Pa.
Hansborough, John W., 1st Lt., Ordnance School, Aberdeen Proving Ground, Md.
Hardigg, William B., Lt. Col., Augusta Arsenal, Augusta, Ga.
Hardy, Rosswell E., Maj., (R. O. T. C.) University of Michigan, Ann Arbor, Mich.
Harmon, Kenneth B., Lt. Col., San Francisco Ordnance District, 58 Sutter Street, San Francisco, Calif.
Harris, Charles T., Jr., Col., Office of the Assistant Secretary of War, Washington, D. C.
Harris, John P., Capt., Ordnance Office, Washington, D. C.
Harrison, Edwin H., Capt., Corozal, C. Z.
Haskell, Robert K., Capt., Watertown Arsenal, Watertown, Mass.
Hatcher, James L., Maj., Hq. Sixth Corps Area, U. S. Post Office Building, Chicago, Ill.
Hatcher, Julian S., Lt. Col., Baltimore Ordnance District, 403 Custom House, Baltimore, Md.
Hauseman, David N., Capt., Ordnance Office, Washington, D. C.
Hayes, Thomas J., Lt. Col., U. S. Military Academy, West Point, N. Y.
Heiss, Gerson K., Capt., Chanute Field, Rantoul, Ill.
Henry, William J., Maj., Hq. First Cavalry Division, Fort Bliss, Texas.
Hinrichs, John H., 1st Lt., Aberdeen Proving Ground, Md.
Hirsch, George W., Capt., Command and General Staff School, Fort Leavenworth, Kans.
Hofstetter, Clarence F., Maj., Army Industrial College, Washington, D. C.
Hogan, Randall J., Capt., Picatinny Arsenal, Dover, N. J.
Holler, Walker W., Capt., U. S. Military Academy, West Point, N. Y.
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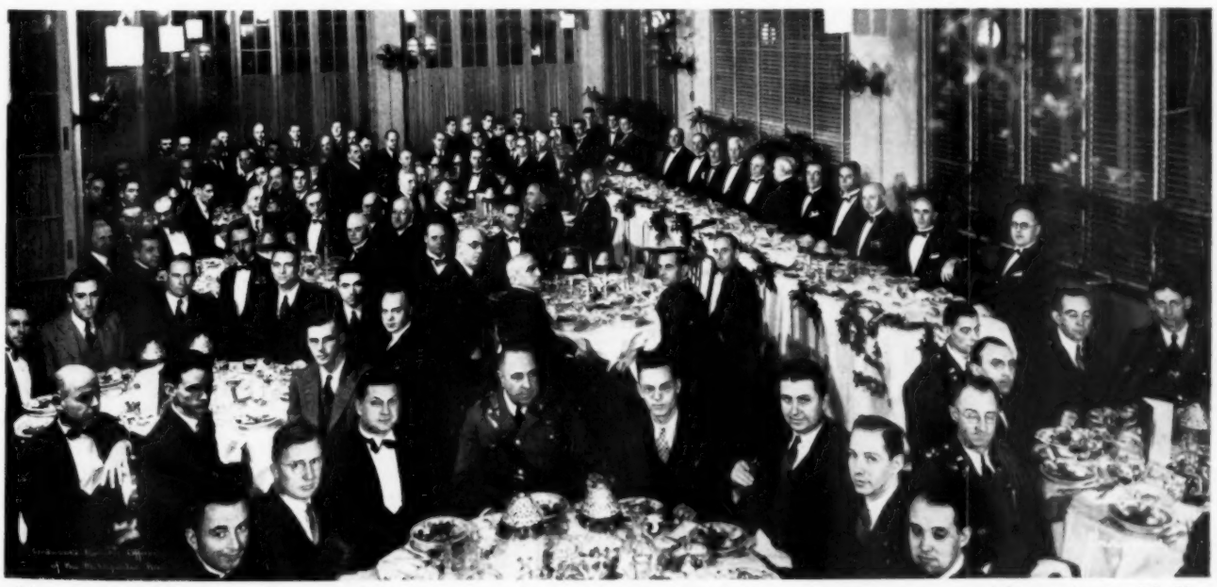
NEW YORK ORDNANCE RESERVE OFFICERS' MEETING

THE Ordnance Reserve Officers of the Corps Area and Procurement groups of the New York Metropolitan Area began their 1935-36 training conferences at a dinner-meeting held at the Hotel Astor, New York City, on October 25th. The guests of honor were Maj. Gen. Dennis E. Nolan, Commanding General, 2nd Corps Area; Brig. Gen. Herman W. Schull, Chief of Manufacture of the Ordnance Department, Brig. Gen. Edward M. Shinkle, Chief of Ordnance Field Service and Col. C. T. Harris, Jr., Chief of the Planning Branch, Office of the Assistant Secretary of War. Brig. Gen. Samuel McRoberts, chief of the New York Ordnance District, presided. Some 150 Reserve Officers were present.

General McRoberts, in his opening address, stressed the need for complete up-to-date drawings and specifications for standard material and urged that steps be taken to bring this phase of procurement planning to maximum efficiency. General Nolan outlined the importance of industrial mobilization. He recommended that studies and surveys be based on current approved designs with educational orders among private manufacturers as a peace-time necessity. General Schull presented a résumé of Ordnance activity in a well chosen address which will be published in full in a subsequent issue of this Journal. Colonel Harris described the work of the Planning Branch particularly during the past year when it was called upon in an advisory capacity in connection with the work of the Senate Munitions Committee. Maj. George A. Sherron was toastmaster. General Schull was introduced by Brig. Gen. John Ross Delafield; Col. Frank W. Roller, Assistant District Chief, presented General Shinkle. Major L. A. Codd, Ord. Res., Executive Secretary of the Army Ordnance Association, also addressed the meeting.



MEETING OF ORDNANCE RESERVE OFFICERS, NEW YORK METROPOLITAN AREA, OCTOBER 25, 1935, HOTEL ASTOR, N. Y.

Ordnance Field Service

ORDNANCE ACTIVITIES IN THE THEATER OF OPERATIONS
PART I

By MAJOR RAYMOND MARSH, *Ord. Dept., U. S. Army*

IN the Theater of Operations, the primary mission of all Ordnance personnel and organization is to render Ordnance service to the troops. The term "Ordnance service" has a dual significance. In one sense, it is applied to all the Ordnance personnel, facilities and establishments that render this service. In this sense, consequently, we see in the organization of the field army a group of Ordnance units entitled Army Ordnance Service. In the other sense of the term, it means the services themselves rendered by this Ordnance organization to the troops. In this sense, the mission of Ordnance service in the Theater of Operations is the supply and distribution, and maintenance and repair of certain prescribed articles, including, generally, all arms, armament, ammunition, tanks, special Ordnance vehicles, bombs and other supplies and equipment issued by the Ordnance Department.

In accomplishing this mission, Ordnance service performs the following duties:

a. Supply and distribution of Ordnance matériel, except artillery ammunition, to all units in the Theater of Operations down to and including the regiment or corresponding independent units. *b.* The supply and distribution of artillery ammunition down to and including refilling points. *c.* The repair of Ordnance matériel in all echelons when such work is beyond the capacities and capabilities of the facilities and personnel available in the units themselves. *d.* The gathering of technical information concerning the proper use and defects of our own matériel, and also any new developments and improvements of enemy matériel. *e.* The custody of captured enemy Ordnance.

Ordnance service is rendered under the military control of the tactical organization which it serves. The authority of the Chief of Ordnance over the personnel and organizations engaged in such service is limited to technical supervision and control. But, it is important to note, this limited responsibility also carries with it the responsibility for proper technical training and instruction, and also the full responsibility that this service is adequately and efficiently performed.

The immediate responsibility for this Ordnance service rests, in the final analysis, on the Ordnance officers of the special staffs. Their duties are adequately set forth in the current edition of the Staff Officers' Field Manual, which prescribes the duties of Ordnance officers as follows: (1) Command, insofar as relates to operations, of Ordnance troops not assigned or attached to subordinate units. (2) Adviser to the commander and the staff in Ordnance matters. (3) Supply of ammunition as far forward as the refilling points and other Ordnance equipment and supplies. (4) Operation of Ordnance storage, maintenance, and repair facilities, including salvage and repair of Ordnance matériel. (5) Technical inspection of Ordnance equipment. (6) Supervision, within limits prescribed by his commander, of Ordnance activities in subordinate units. (7) The collection of information concerning Ordnance matériel.

From this résumé of the missions of Ordnance service and the duties of Ordnance officers charged with the responsibility for that service, it is apparent that the functions of Ordnance service may be divided into two general classifications; first—supply; and second—maintenance. Supply may be divided further into two groups—general supply and ammunition supply. The distinction between these two phases of supply will become more apparent as we point out, later on, the separation of these two supply services and the distinctions between them.

It has been brought out previously that all Ordnance activities may be generally grouped into two classifications, namely—provision and distribution. Similarly, Ordnance service may be divided into those same two general classifications. Ordnance service must supply items of Ordnance matériel. In obtaining these items there must be set up a requirement as to items and quantities, and then these requirements must be procured. Once the items are procured, their distribution must be effected in order to accomplish military supply and this, as we know, consists of the phases of reception, classification, storage, and issue. It must also be borne in mind that, coincident with the beginning of the storage phase, Ordnance service must begin to exercise the functions of inspection, maintenance, modification, alteration, and repair.

CONSIDERING now the question of Ordnance supply, let us see the general methods by which that problem is handled. In the communications zone, the requirements consist primarily of reserve and maintenance requirements. Reserves consist of supplies, measured in days of supply, in such quantities as may be indicated by the theater commander or may be permitted by the status of supply. Maintenance requirements consist of the quantities required to meet current consumption, replace wastages, and provide those additional quantities which are absorbed in the machinery of distribution. In some cases, there will be an additional requirement covering the initial equipment of troops, but generally speaking, units will enter the Theater of Operations with their initial equipment complete, except perhaps ammunition. Supplies are procured from the Zone of Interior as a result of requisitions, schedules of shipment or priorities. There may be some local procurement, but as far as Ordnance is concerned, such local procurement will generally be small and relatively unimportant. Reception is effected at the bases of the communication zone, which may be ports of debarkation, railheads or other similar installations in reasonably close proximity to the boundary between the Theater of Operations and the Zone of the Interior. In the Theater of Operations, for purposes of administration, military supplies are classified into the four classes designated by the Roman numerals, Classes I, II, III, and IV. Ordnance matériel falls in the last two classes. Class III includes items of individual and organization Ordnance equipment, and Class IV includes chiefly ammunition, which constitutes our biggest and most serious supply problem from every viewpoint.

Storage is effected in the communication zone depots, and initially in the base depots. These may be general depots or they may be branch depots, and there will be separate ammunition depots established. In the intermediate and advance sections of the communication zone, if they be organized, stocks will be balanced. In these several depots where Ordnance items are stored, in addition to being classified as indicated above, in two of the four Roman numeral classifications, the Ordnance items will be classified, grouped and stored by the S.W.L. letter designated groups which have been discussed previously.

In the communication zone, issues are made to the armies, to communication zone troops, to GHQ troops and to such other troops as may be in rest areas, training areas, etc.

From the communication zone, supplies flow through regulating stations to the armies, where they come under army control. In the armies, requirements are based on maintenance demands and the estimated consumption of future or projected military operations. The supplies based on these two major requirement factors are procured from the communication zone, as a result of requisitions or drafts against credits. Reception is affected at Army installations, through the regulating stations. These army installations are army depots, either general or branch. Railheads must also be considered as being one of the reception places.

In the army area, classification is by service and in the Ordnance depots, Ordnance property will be grouped under the same two sets of classification as those used in the communication zone.

Storage is effected in the same army installations where they are received, that is, depots of one sort or another, dumps, and railheads.

Issues are made direct to army troops, to divisions, and to corps troops.

THE next unit in the military organization is the corps. But the corps does not have a place in the chain of supply. A corps is described primarily as a tactical unit of execution and maneuver. It normally has two to four divisions, but the number during actual operations may be greater. It has an organization so flexible that it can absorb and utilize reinforcing units or form part of a higher unit. Except when the corps is acting independently or when administrative and supply functions have been delegated to it by the army, the corps has administrative and supply functions for its corps troops only. Despite this official description of a corps, we find that the corps now has imposed upon it certain supply functions for its component divisions, the principal one of which is that the corps is supposed to carry, in its service trains, reserve items for the use of its component divisions. These supply functions are not only contrary to the official concept of a corps, but the very flexibility of the corps organization makes it impossible for any one of its component divisions to rely upon the corps for a definite amount of supplies, either in number of rounds, tonnage, days of fire, or days of supply. The normal supply functions of a corps should therefore be limited to its corps troops only, and studies now under way in the War Department will eventually lead to eliminating from corps service trains any items for which its component divisions may have a claim, or may expect to be supplied in a routine manner.

The next link in the chain of supply is the division. Here, as in the army, requirements are based on maintenance factors and estimated consumption of near future operations. Procurement is effected from the army as a result of requisitions or drafts against credits. Reception is by means of the division service trains. Classification is by service. Such storage as may be necessary is accomplished on the division service trains or, in a stabilized situation, at such division dumps as may be established. Issues are made at distributing points, to the field and combat trains of the troops, or in some instances, delivered to the battle position of the troops or to the troops' bivouac.

BEGINNING with the refilling point, ammunition supply separates itself from Ordnance general supply. It will be recalled in the summary of duties of the unit Ordnance officer, he was charged with the responsibility for the supply of ammunition "as far forward as the refilling point." Interpreted as this is written, it would mean that in the division no Ordnance officer would have any responsibility whatsoever for any question of ammunition supply because of the fact that refilling points are always to the rear of the divisions and ordinarily in the corps service area. Nevertheless, in the same Staff Officers' Field Manual from which we extracted the list of duties of the unit Ordnance officer, we find the statement that the supply of small arms ammunition in the division is a function of the Division Ordnance officer and that when the division needs a resupply of small arms ammunition, he will arrange with the Division Quartermaster for the necessary transportation of the desired small arms ammunition from the proper refilling point to the desired distributing point. It is also prescribed that the supply of field artillery ammunition is a function of the artillery commander, and that he will arrange for this supply through the medium of his brigade ammunition train from the designated refilling points to the artillery ammunition distributing point. So, in the division we find, then, that the Field Artillery exercises all responsibility for and all control over their own ammunition supply, from either refilling points or army depots. This arrangement is not considered satisfactory from any viewpoint, but beyond pointing out the existing arrangement nothing further will be said in this article about ammunition supply. It is proposed later on to devote an entire article to a discussion of the present ammunition supply system, its defects and proposed remedies.

WE have traced now the channels, the methods, and the general system in the flow of supply of Ordnance items from their reception at the base depots of the communication zone up to the troops who require and who will use the items. Let us now consider the facilities at the disposal of Ordnance officers to effect such of these tasks as is their responsibility. Under present policies, reliance must be placed upon the military organization, which includes maintenance companies of light, medium and heavy characteristics, depot companies, ammunition companies and, for each field army, a headquarters company, and staff personnel in all echelons down to and including the division. These military organizations are assigned in a conventional manner to the typical field army organization. In this type organization, there is an Army Ordnance Service group consisting of the appropriate headquarters, which is part of army headquarters, three Ordnance ammunition companies, one Ordnance maintenance company and three Ordnance depot companies. It is the function of the ammunition companies to provide the supervisory personnel for army ammunition installations. The primary function of the maintenance company is the operation of a small arms repair center. The Ordnance depot companies operate such Ordnance general supply depots as may be established in the Army area.

In the corps we find in the corps troops, in the special troops organization, a heavy maintenance company and an ammunition company. It is the function of the ammunition company to provide the supervisory personnel for such ammunition depots, dumps, or refilling points, as may be established and operated by the corps. It is the function of the heavy maintenance company to provide maintenance facilities for corps troops, GHQ units temporarily assigned to and serving with the corps, and to support the medium maintenance companies in the component divisions of the corps. In the corps there is another Ordnance unit, which is the Ordnance maintenance company, organically a part of the corps artillery brigade. Its function is primarily that of the maintenance of the artillery matériel pertaining to the brigade.

In the Infantry Division there is in the division special troops, an Ordnance maintenance company of medium characteristics. Its primary mission is the maintenance and repair of Ordnance matériel of all classes pertaining to the Division.

In the Cavalry Division there is likewise an Ordnance maintenance company, but because of the increased mobility of the Cavalry Division, this maintenance unit is a light maintenance company. The functions of this Cavalry Division Ordnance company are similar to those already prescribed for the Infantry Division maintenance company.

In addition to these Ordnance troop units which are assigned to this type field army organization, there are other Ordnance troops who will operate in the communication zone. These will be chiefly ammunition and depot companies. There will also be maintenance units of various types which are required to operate the facilities of all types throughout the communication zone. The facilities for maintenance purposes include basically the mobile equipment of the mobile repair units. In the communication zone, however, particularly at the base, there will be, normally, shops of more or less permanent characteristics and of a size adequate to undertake any kind of repair short of a complete rebuilding of a unit.

There are still other units of all categories which pertain to the GHQ. These Ordnance companies will constitute a pool of Ordnance troops which will supply the requirements of army or corps reinforcing units, from GHQ, for Ordnance service. At the present time, the units pertaining to GHQ reserve are listed by individual regiments or other comparable independent organizations. With the exception of the railway artillery regiment, none of these units is entitled to the organic assignment of Ordnance personnel. When these GHQ reserve troop units are assigned to army or corps for employment, they will carry with them certain

of these Ordnance service units now pertaining to GHQ. If, in such few instances as there may be, where this is impracticable, then the service demands of these reinforcing units will be added to existing functions of Ordnance units pertaining to the major tactical organization to which these other units are assigned.

THE Infantry Division maintenance company is the backbone of the Ordnance supply and maintenance system in the combat zone. I propose to devote the next article to a discussion of the organization, function, and operation of this unit. Consequently, my comments here on the subject of maintenance and supply will be limited to a few remarks of a general nature. Maintenance is essentially a phase of supply. It is a phase of supply in that it receives unserviceable matériel as it is turned into supply channels, repairs it and turns it back into those same channels without the necessity of having such unserviceable matériel go farther back along the channels of supply than is absolutely necessary. Practically, maintenance means that when an unserviceable item can be repaired by a facility close to the troops, the troops will not ask for a replacement for that article but will merely ask for its repair. It is very evident that the greater the volume of repair which can be effected in this manner, close to the troops, the smaller will be the demands for supplies on the supply echelons further in the rear. Maintenance thus becomes an Ordnance service of the utmost importance. The only restrictions on the type or scope of repairs which may be undertaken in the field are the available equipment and the available time. When the damage is of such scope as to be beyond the capacity of the equipment and the time available in the division maintenance company, the article is evacuated through army installations and the regulating station to the repair shops in the communication zone. Where the damage is of such a nature that it may be repaired within the time available, but requires the use of a machine tool larger than is in the division unit, then this item may be taken to the corps heavy shop where the machine tool equipment is much larger and much more extensive. In this scheme of operations, the heavy maintenance company of the corps is intended to back up the Infantry Division maintenance company in only this respect. Consequently, the bulk of the work which is beyond the capacity of the division unit is evacuated directly to Army installations and the regulating station, to the communication zone.

The function of general supply was imposed upon the Unit Ordnance officer in the 1922 edition of the Staff Officers' Field Manual. Despite the imposition of this additional function, no additional facilities were authorized to meet this demand. However, it is a fact that the amount of general supplies which could be transported with the company must be necessarily limited. The requirements for general supplies for the individual may, in the combat zone, be almost completely met from salvage, particularly when you consider the fact that at the present time—and during the World War—it is the policy of our Army to forward replacements completely equipped with their individual equipment, including weapons. The big need for supply, then, is limited almost entirely to organizational equipment. The very nature of this equipment is such that but very little of it can be transported in reserve. The main function of the maintenance company in exercising its supply functions must be to maintain in a serviceable condition this organizational equipment.

SHOULD it become necessary during combat to replace items of organizational equipment, it appears logical to assume that the main role which will be played by the maintenance company in effecting this replacement, will be that of delivery. By that I mean that the company with its own transportation and personnel might properly proceed to an Ordnance depot or some other supply point in the rear, obtain the desired items and then deliver them to the organizations where needed. In this connection it is worth noting that the Quartermaster in his train carries only reserve supplies of rations, no organizational or individual equipment being transported in what we are pleased to call "rolling reserve." The chain of supply for replacement of such organizational equipment is direct from the division through army installations to the appropriate supply point. The chain of supply does not flow through the corps because, as we have discussed earlier, the Corps has no administrative and supply function except when acting independently, when it then becomes in reality a small field army, with all the obligations that an army has imposed upon it. The supplies and equipment of the corps Ordnance units may be made available through coöperation for use by the divisions, and the division companies may frequently save considerable time and distance by obtaining certain items of supply from these Corps units, but in no case will you find that there is a regular authorized or contemplated flow of supplies from army installations to the corps and then through the corps to the divisions. The supply of general Ordnance supplies may be effected efficiently and satisfactorily through the inclusion in the Ordnance organization of a section adequate in size and equipment to meet the requirements.

During operations, the demand for Ordnance general supplies will normally be small. During periods of inactivity, or while the unit may be in rest areas, the demands for Ordnance general supplies may approximate a general re-equipping of the unit. For such general re-equipping, it cannot be expected that the organic Ordnance personnel charged with the mission of supply will be adequate, or in fact, that they should be adequate. Such a general re-equipping is not an ordinary procedure, and although in certain operations, as during the World War, it may become a frequent occurrence, it must be remembered that such re-equipping will ordinarily take place in rear areas adjacent to more or less permanently installed supply points, and it is felt that the additional personnel required for such a general replacement should be met by details of the necessary Ordnance personnel from these several supply points, or from the higher service commanders.

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Book Reviews

WAR IN THE MODERN WORLD. By Newton D. Baker. New York: Houghton Mifflin Company. 1935. $1.00.

THIS masterpiece comes from the pen of the distinguished former Secretary of War whom the Army Ordnance Association honored recently with its highest award. Quite appropriately this review appears in these pages simultaneously with the great address delivered by the author at the Seventeenth Annual Meeting of our Association which is published on page 143 of this issue. It is entirely unnecessary to speak of the qualifications of Mr. Baker whose fame for public service, officially and unofficially, ranks him among the foremost citizens of our country. It is more appropriate to describe briefly the circumstances under which the text of this book was written.

"War in the Modern World" is the subject of an address delivered by Mr. Baker at Milton Academy for the Alumni War Memorial Foundation, May 13, 1935. The plan under which the Foundation operates was adopted in 1922 and provides a permanent medium "for lectures and informal conferences dealing with the responsibilities and opportunities attaching to leadership in a democracy." The Foundation was established at the Academy in memory of the twenty-two alumni of the school who gave their lives in the World War.

Condensed within the narrow confines of 63 pages, the author states a philosophy of thought and of action which, in our judgment, is flawless. A first reading of the text takes scarcely half an hour. But its genius compels subsequent perusal of many hours. It will be a source of frequent reference always. Without doubt this little book will rank, if not immediately certainly eventually, among the great analyses in our language of the age-old question, war or peace. It is factual, realistic and, with all, practically idealistic. Its approach to the question is so sound, its conclusions so logical and its statement so terse that it commands a place in the classics of our day.

Newton D. Baker was a great Secretary of War—the past fifteen years have not detracted from his greatness while each succeeding year has added immeasurably to it. When the final appraisal is written by other generations it will record him as an exceptional statesman for many reasons, not the least of which will be that as a civilian head of a military department he backed his professional subordinates with unflinching courage and, unlike many statesmen in the record of our own country, he did not vacillate in his constant prosecution of the then military objective. Strangely enough, during the past decade, popular ideas have somewhat misunderstood Mr. Baker's devotion to the cause of peace. But he is not the impractical, unrealistic peace advocate. He is far too sound to be misled by mouthy slogans anent the impossibility of war, the practicality of disarmament and the sudden reform of mankind. Like all sensible people he recognizes armed conflict to be exactly what it is—a scourge from which relief must be sought. He praises, and rightly so, realistic efforts of our age for conciliation and coöperation. But he does not go beyond the bounds of reason and experience. He recognizes the problem of security, the justice of a just war; he condemns the condemnation of so-called militarism in our country, he berates the attitude of personal withdrawal. He reduces his factual approach to the civil and military points of view and concludes that peace efforts must be continued but they must be sane. His text draws striking conclusions from Brooks Emeny's classic, "Strategy of Raw Materials," and Frank Simonds' "The Great Powers in World Politics."

Were the facilities at the command of this reviewer he would urge that "War in the Modern World" be accepted by both sides in the militaristic and pacifist discord. Unbiased minds from both approaches will concede it to be an expression, crystal clear, of the usefulness or necessity at one time and the usefulness or folly at another of the means of imposing the national will by other than peaceful processes. This means is what is called war. It continues to have place in the modern as it did in the ancient world. O. E. D.

YANKEE ARMS MAKER. The Incredible Career of Samuel Colt. By Jack Rohan, New York: Harper & Bros. 1935. $3.00.

TO us of the present generation, Samuel Colt is but a legendary figure. We know that he "invented" the revolver, and whittled out a wooden model of his idea while a sailor aboard a windjammer. But his antecendents, his family and friends, his failures and his successes, his relations with important persons of his time, both here and abroad, the industrial empire which he builded and the heritage he left—are to most of us a sealed book.

So we are indebted to Mr. Rohan for having torn away the veil to reveal the Samuel Colt who lived and breathed, and who was indeed a very real being. And we are doubly fortunate in that the author of this fascinating biography has had access to so much source material of unquestionable authenticity. He has been able to paint his subject so vividly that, when we lay the book aside, we feel we have actually seen the doughty Colonel stalk across a living stage.

The life of the man who perfected the first practicable revolver (the "revolving" principle is, of course, as old as firearms) differs little from that of many sturdy New Englanders of his time. Hard work, and plenty of it first through necessity —and later by preference, was his lot from the day of his birth until his untimely death in 1862. In such a school only the fittest survive, but from the very first, Colt was able to give and take with the best. Resourceful to the last degree, never admitting failure or defeat, he merely bided his time when ill winds assailed him, ready to launch a new campaign when the omens were more propitious. A devotee of the handgun from his nursery days, he acquired an ancient horse pistol before he was twelve, surreptitiously concealing the forbidden prize from the eyes of unsympathetic elders, to unpack and gaze upon it in adoration on those rare occasions when a few moments of solitude were his. The weapon was to him a constant inspiration, not only to become conversant with its function and use, but to build another better. His father's disapproval, the importunities of his friends, and the enormous difficulties which beset him at every turn, were as nothing. He had established an objective—the design, patenting, and exploitation of a hand firearm which would be *so much* better than anything which had previously existed that it must gain universal recognition by reason of sheer quality. And after trials, which would have caused many a stout heart to falter, he succeeded.

Colt's life parallels in many ways that of the average great industrialist of his own and other times. Such men are usually of stern stuff, taking what they want peaceably if they can—by force if necessary. Most of them are not overly sensitive as to who buys their products, so long as they are bought. Most of them are men of vision, forseeing business

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cycles and social upheavals far in advance of their less sagacious brethren. Colt was but little different. When foreign nations began to rattle the sword, he was among the first to visit their respective capitals, selling impartially to one and all—if they had the price.

But in those years the public conscience on matters of munitions was not as sensitive as it is today. And although he had his troubles, and plenty of them, with the Congress there was no Senator Nye to harass and discomfort him. Indeed, the manufacture and sale of arms was considered a perfectly reputable occupation and the idea that it was inspired of the Devil had yet to be conceived. Individuals indulged in the naïve idea that it was the duty of a courageous man to defend his person and property against marauders with the best weapon he could secure, rather than submit to disarmament by law in favor of the ever-armed assassin who knows no law, as is the case today. And so the worthy Colonel was spared many of the trials which would have been his had he lived in a later generation.

But while he pushed his sales vigorously and successfully over the face of the civilized, and uncivilized, globe, Rohan offers no evidence to indicate that Samuel Colt was not a man of honor, respected by friends and enemies alike. He was often pressed for cash, desperately so, but nevertheless was not one to forget his debts merely because they were of long standing. And he had a much livelier conscience than many of his capitalistic contemporaries. The prospect of a Civil War, when it commenced to loom large, meant to him something more than profits from the sale of armaments. It signified a frightful holocaust which would shake the nation to its foundations and the prospect saddened rather than delighted him. And here again was his foresight evident, for he predicted a struggle lasting five years with millions under arms. Well might some of the political lights of his day have taken counsel of him!

But in one respect Colt stood apart, and above, his "big business" contemporaries. In an age when tots toiled at looms over a fourteen-hour day, and labor, skilled and unskilled, was treated like so much cattle, he went out of his way to make provision for the welfare of those in his employ. Improved housing, modern sanitary arrangements, and social diversions offered by the formation of company bands, debating societies, and what not, made the lot of the Colt workman much different from that of his less fortunate brother. But this was not all. For the Colonel even went so far as to devise and institute a system of old age pensions for his faithful servitors! So revolutionary was this idea in that day and time that a whispering campaign instituted by his enemies, to the effect that his mind was failing, received great impetus when his "fantastic" scheme was divulged!

And although the author of this biography hints from time to time in no uncertain manner that Colt was possessed of most of the weaknesses that flesh is heir to, his own work refutes him. Faults he had, but his virtues far outweighed them. And we turn the last page satisfied that here was a great man, a good man, a just man and a brave one, and that the world is better for his having lived!

Rohan's style is delightful, and his story of "Colonel Sam" unfolds in such compelling fashion that one can scarcely set the book down because of his anxiety to learn what new dragon the doughty warrior will meet and conquer on the next page. The volume is charmingly free from misprints and typographical errors. The author is, thanks to the fund of documents which were available to him in his studies, and a very evident desire to interpret these faithfully, historically correct in most of his statements. A minor error occurs on page 172 wherein he states that "The first few hundred (referring to revolvers being produced in 1848-49) bore the wording 'Address Col. Colt, New York.' The later shipments were

lettered 'Col. Sam'l. Colt, Hartford!'" As a matter of fact, the 1848 models bore Colt's name *without* the military title, this first appearing on the 1849 product, and it was not until some years later that the Hartford address was adopted.

Rohan also apparently is willing to let the reader infer that Colt was perhaps the first arms maker to produce on a large scale, weapons composed of truly interchangeable parts, although he does not make a positive statement to that effect. That such is not the case can readily be established by a perusal of "Simeon North, First Official Pistol Maker" (Concord, N. H., 1913). An extract from North's contract of April 16, 1813, with the U. S. Government, in which he agreed to furnish the latter twenty thousand pistols (op. cit., pp. 80-82) reads: "the component parts are to correspond so exactly that any limb or part of one pistol may be fitted to any other pistol of the twenty thousand," and history shows that North was able to make good on this stipulation.

The only other error noted was the spelling of the word "deringer" as "der*r*inger" (p. 48), a mistake common to the uninitiate, but one of which a man as well acquainted with arms as is the author should not be guilty.

Rohan has shown himself a master of biography, and a writer to be reckoned with. May his pen never run dry!

C. G.

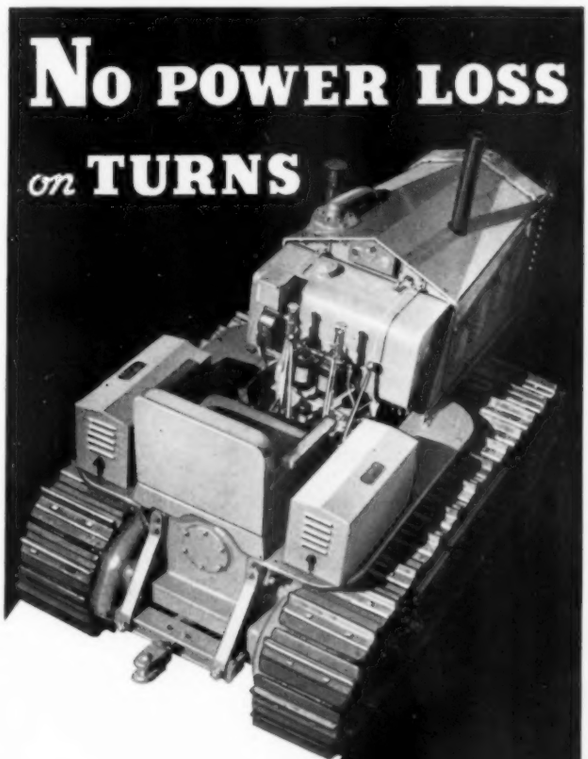
THE CAMPAIGN OF THE MARNE 1914. By Sewell Tyng. New York and Toronto: Longmans, Green and Company. 1935. $3.75.

PERHAPS, within the memory of mankind, the Campaign of the Marne stands out as the most forcible lesson in human fallibility that the race has ever suffered. Thumb the pages of history as you will, but nowhere will you find within the short space of forty-odd days a more drastic verification of the oft-quoted line of Robert Burns: "The best laid schemes o' mice an' men aft gang a-gley."

For a generation Frenchmen and Germans had been preparing for the event. Carefully educated men of both nations had labored night and day to make certain that nothing would be wanting at the crucial moment. In the process, however, on both sides of the Rhine there had accumulated the fungus of preconceived notions that left little room for the tender shoots of realistic thought. The orthodox professors of academic war calmly went ahead with the development of the plans of their predecessors, ignoring the troublesome matters that threatened to upset their stanch convictions. Humbler folk were less impervious to the obvious; the casual traveller in northern Europe was not long left in doubt regarding a German advance in strength through Belgium; the most junior officer accepted as an axiom that there must be free communication between the major elements of an army and that a single mind must exert active control. Yet in the opening campaign of the World War the vital failures were based upon these fundamentals! Well may the student of human nature quote further from Burns:

> "But, och! I backward cast my e'e
> On prospects drear!
> An' forward tho' I canna see
> I guess and fear!"

Mr. Tyng has produced a book that is worthy of the study of all military men. It is a careful account of what is possibly the climax of twenty centuries of warfare. Within the geographical scope of the Marne Campaign there probably will never be massed greater armies; man's ingenuity had been strained to the utmost to equip them. The outcome lay within the nature of man himself, as in the case of all great struggles. There was no faltering in the rank and file, the nations were resolute, but a stolid, tenacious man led the French; the



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aged von Moltke was ill and uncertain. It was a repetition of the lesson that is so common in history. At Austerlitz Napoleon was thirty-six, Kutusov was sixty.

The details of events are known to military readers, but the present volume presents them in a form that cannot fail to be of value for quick reference. In addition, and of vastly more consequence, it provides an excellent and common-sense study of the Victor of the Marne. In many respects Marshal Joffre was much like Grant, and where brilliance is lacking ability is not quickly recognized. Only the present generation is coming to appreciate Grant as a military figure of the first rank. His victories were not mere coincidences, his subordinates were not responsible for Vicksburg, Chattanooga, Appomattox. Likewise, though ambitious and nimble witted men were quick to claim credit, the Marne was no miracle but a laboriously executed maneuver, not conceived in a moment, not dictated by politicians or retired officers, but brought about by the prudent mental processes of a simple, hard-working man, and forced to the ultimate issue by the unrelenting resolution of that man.

In retrospect it seems incredulous that the meticulously trained German High Command could have made the errors that it did. Joffre could not have counted upon them, and there is no evidence that he did. But, like Grant, he failed and tried again. And herein lies the true measure of his military capacity; on the Marne he was able to concentrate eleven divisions against von Bulöw's two and a-half. The mystical phrase that we hear so often and so seldom understand was made an actuality; a preponderance of force was concentrated at the decisive point. Much good paper and ink has been devoted to proving that the German Army was not defeated at the Marne, but Mr. Tyng makes it very plain that disaster faced the First and Second German Armies if they had not retreated. The pursuit was a failure. Try as he would Joffre could not push his exhausted men forward in the face of rear guards armed with machine guns. Spent victors have experienced this before in war, and unless tanks can take over the role of cavalry we may expect it as a commonplace in future.

As the scientist observes in an individual the recapitulation of the phylogeny, so the student of this campaign may find a repetition of the development of the art of war. At the Frontier cavalry clashed with lance and saber, later masses of infantry in red trousers with bayonets gleaming in the sun were played forward by their bands, artillery galloped up into position for direct fire—old habits are hard to throw off. But by the time the Germans turned at bay on the Aisne, the troops had learned the value of the intrenching tool, warfare had advanced to the model of 1864, and men knew that only twentieth century engines of war would break the deadlock.

Mr. Tyng's presentation is concise and orderly, attention is directed to the principal sources of information, the combat situations are readily fixed in the mind by sketch maps. The brief comments of the author are conservative and based on sound reasoning. The book is unhesitatingly recommended to any one interested in the conduct of war. J. M. E.

Road to War. By Walter Millis. New York: Houghton Mifflin Co. 1935.

How does a nation of some one hundred and twenty millions of people, containing such diverse and opposite types as the broncho buster of the west, the broker of New York, the tenant farmer of the south, the mill owner of New England and the politicians who "view with alarm" or "point with pride to" the same act ever become united on one thing as this nation did in the World War? Read this book and find out. Wm. Allen White describes the tale as the "story of a nation that went mad." Looking back after a lapse of almost

twenty years it is hard to realize that this country went through such a turmoil; was so agreeable, while still neutral —at least, in name—to the acts of one set of belligerents and so bellicose in the face of similar acts on the part of the other set of belligerents; and could possibly be not "babes in the woods" but boobs in the wiles of European diplomacy.

In the early summer of 1914, the United States was still in a mood of benevolent self complacency. The Democrats had but the preceding year come back into power under a slogan of a new birth of freedom. The President was acclaimed as one who had scorned the support of both the bosses and the plutocrats. He had also attempted to introduce idealism into international relations as evidenced by attack on dollar diplomacy, "watchful waiting" with Mexico, and the peace treaties of his Secretary of State. True, there was a depression of a sort in existence but business leaders were proclaiming that the country was on the verge of the greatest boom in the history of the country. With more prophetic vision than they realized leaders predicted that prosperity was just around the corner.

Such was the condition of America when the assassinations of Sarejevo occurred. Within a week, newspaper comments had disappeared from the front page although some were writing about the gravest possibilities of war because of these murders. Thus, when the German and French mobilization decrees were published on August 1st, it was indeed news. When England joined the Allies it was not only another piece of news for the newspapers but for the people of the United States it was an event of the first magnitude because, from then on, through the cutting of the German cables by the British Navy and the coloring of the news through the British news agencies and official censors, the American public was the target of Allied propaganda. In the first few days of the war the United States had received the essentials of what later was perfected as the Allied thesis of the war. German militarism was almost universally conceded to be the basic cause of the war.

In the meantime, in Europe, history was being made. Belgium was over-run, the unknown 42-cm. howitzers had quickly pounded impregnable fortresses to ruins, our ambassador to Belgium saw the mightiest torrent of armed power he was ever to see as the German army poured through Brussels for three days and nights without pause, the battle of the Marne was fought, England's "Old Contemptibles" behaved as only English soldiers can, the race to the sea was made and the deadlock of trench warfare began.

In the face of these stirring events, little attention was paid to the fact that there was no German side to the accounts, arguments and discussions of the war or that maybe Allied censorship was possibly exerting some influence upon the accounts of these events. Consequently, the tales of Belgian atrocities were accepted and the appeals for aid for the Belgian refugees met with an immediate and unsuspected generous response. The French sympathies of our French ambassador led directly to the formation of the American ambulance and did not prevent the formation of the Lafayette Escadrille.

The first American reaction to the Europen conflict was undoubtedly one of thankfulness for the war's remoteness, the separating spaces of the Atlantic Ocean and the quickly announced Washington policy of neutrality. However, the idea of American mediation was a close second to this feeling of thankfulness and on August 4th the Senate adopted a resolution urging the President to undertake a settlement "by mediation or arbitration." Nothing came of the President's suggestions except to fix the idea of American interference of some sort.

But early in the war, mixed with expressions of Allied sympathies and hopes of American mediation, problems of neutral rights and neutral duties made themselves heard—and felt too. The depression of the early summer had become deeper and more severe as our maritime trade disappeared. The policy of the Allies to starve out the Central Powers, coupled with British con-

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trol of the seas, completely wiped out our large trade with Germany and her Allies. While Great Britain skillfully temporized American protests on interference with our neutral shipping, prosperity came around the corner and orders from the Allies for food, raw materials, commodities and munitions started America on the greatest industrial boom it had yet known. A big American banking house became the Allies purchasing agent, allied bond issues were floated and almost unlimited American credit became available for the British and French. We did not refuse to sell supplies to the Central Powers but the British Navy saw to it that we didn't deliver anything to Germany and that German ships never left American ports.

To stop the flow of American goods to the Allies, the Germans adopted the submarine, cautiously and limited at first but finally without restriction. The LUSITANIA was sunk with the loss of 124 American lives. The natural wave of horror was fanned into burning hostility to Germany by every available agency of Allied propaganda.

President Wilson's first Lusitania note in reality demanded the cessation of submarine warfare under threat of war. Feeling that our diplomatic course was heading us straight for war the pacifistic but conscientious and common-sense Mr. Bryan resigned as Secretary of State.

Just about this time the watchful-waiting policy with respect to Mexico produced a diverting interlude. After months of depredations against American lives and interest, Columbus, New Mexico, was suddenly raided by Villa. The Punitive Expedition was sent into Mexico in pursuit of the bandit, the National Guard was mobilized along the border and Pershing's name became familiar throughout the land. Although the Punitive Expedition did not capture Villa the whole affair showed the lamentable state of unpreparedness of our military forces and gave a tremendous impetus to the growing agitation for preparedness. Preparedness became the shibboleth of American life. The preparedness parade in New York City on May 13, 1916 was stupendous and its effect impressive. Even Congress and a peace-loving administration voted and approved material increases in the regular army!

In the midst of this preparedness movement, while business boomed on war orders, while "blood soaked" dividends were denounced by pacifists, while the State Department wrote strong notes of protest to the British government over British violation of our neutral rights, while the clever allied propaganda machine built up an American opinion more and more favorable to their cause and while the German agents in America annoyed and irritated everyone by their stupidity, the Democratic party waged a political campaign and reelected President Wilson on the slogan "He kept us out of War." Nevertheless, more than one thinker knew that allied war contracts and loans had so enmeshed this country with allied interests that the end of the war or American intervention were the only alternatives.

In January, 1917, the German government announced that she would "meet the illegal measures of her enemies" by establishing a war zone around the British Isles and sections of the European coasts and would sink all ships found in that zone. Three days later, diplomatic relations with Germany were broken off. Although so natural, so logical and so necessary, this severance of diplomatic relations eliminated all chance of American mediation and made American participation in the war merely a question of time and patience.

"Armed neutrality" followed as a result of presidential pronouncement. Sinking of ships in the unrestricted submarine warfare of the Germans continued and American ships and lives were included in the losses. Mr. Elihu Root announced that it was either war or submission to oppression. When the President convened Congress in special session two weeks ahead of time, public opinion no longer considered would we or would we not enter the war. The question being debated was how large will be our war effort.

In one of the most dramatic joint sessions of Congress that the

Capitol has ever held President Wilson announced that "we will not choose the path of submission" and he continued on to ask that Congress "formally accept the status of belligerent which has thus been thrust upon" the country. Four days of Congressional debate followed. The Senate adopted the War Resolution by a vote of 82 to 6; the House followed by a vote of 373 to 50. And, save for the formalities, America had reached the end of this frenzied, chaotic, tumultuous road to war.

No review does justice to this book. The mass of research, covering of newspaper columns, coordination of widely separated happenings and appraisal of events entitles it to a place in the list of worthwhile books. It is written with a strain of sarcasm and cynicism which, while not merited as universally as applied, nevertheless, imparts a lightness to what might be heavy reading and makes the book all the more readable. R. M.

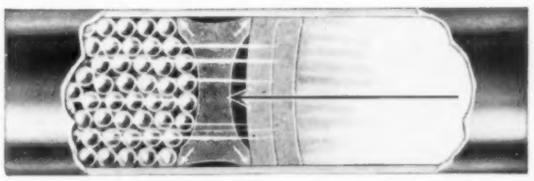
THE AUTOBIOGRAPHY OF GEORGE WASHINGTON. 1753-1799. Arranged and Edited by Edward C. Boykin. New York: Reynal & Hitchcock. 1935. $2.50.

FEW men in public life have equaled George Washington in bequeathing to posterity so many letters and documents and so complete a diary as source material for the biographer. In this book, Mr. Boykin has chosen to become an editor of this voluminous material and to arrange, with a minimum of comment and connecting narrative, Washington's own writings and speeches so as to create an autobiography that reveals the acts, the thoughts, and the motives of the first president from his twenty-first year to the words spoken on his death bed. In 1798 Washington wrote "my whole life has been dedicated to my country in one form or another." That portion of his life dedicated to his country on the battlefields of the Revolution occupies the larger part of this autobiography. It is by no means an overemphasis on his military career, and, at least for the military student, will be a welcome selection from Washington's papers. The conception of the book is sound because of the extensive material available. The result is a life of Washington that meets his own requirements, for he wrote: "No history of my life .... could be written with the least degree of accuracy unless recourse was had to me or to my papers for information." D. A.

DICTATORS AND DEMOCRACIES TODAY. By John Martin. Winter Park, Florida: The Rollins Press. 1935. $2.50.

IN this book Professor Martin has collected a series of eleven lectures, the first four of which he groups under the heading, "Machinery for Peace." This machinery, which consists of the League of Nations, the Kellogg Pact, the World Court, and the almost universal desire of the peoples of the world to avoid war, is necessarily in a rudimentary stage of development, and hence not wholly effectual. But in spite of unfortunate setbacks, constructive steps have been taken, some measures have proved successful, and each year the value of international coöperation through the League has been demonstrated. The author is confident in the hope that the evolution of civilized society will bring about the perfection of this machinery. He is a sincere advocate of peace, but not a fanatic; his common sense and patriotism are apparent on every page. He takes occasion to warn us that our first duty is to our own country, our Navy must be maintained in strength, our shores must be safe from invasion. Concerning Japan's adventures on the Asiatic mainland, he does not mince words. At the same time, he is skeptical of our Open Door Policy with respect to China, and because of our attitude toward Manchuria, he expects that we shall have to accept a measure of humiliation. But, in answer to the war mongers, he sees no reason why we should carry a war to the western shore of the Pacific—not for our own minute interests there nor for the interests of any other nation.

The remainder of the volume is devoted to brief discussions of the great dictatorships, Russia, Italy, and Germany, and the great democracies, France, Great Britain, and the United States. The



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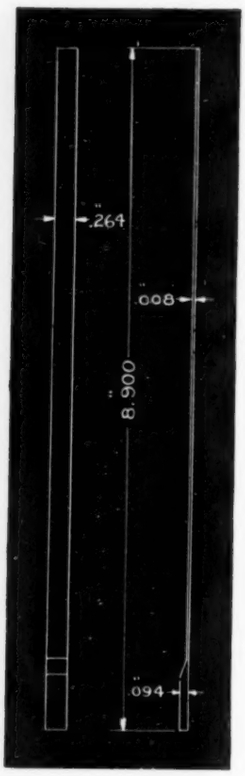

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style suffers from the very apparent fact that the various chapters were designed to be delivered from the eminence of the lecture platform, and consequently, they are adapted to the mental least common denominator of his audiences. However, this is not true of the last two chapters which deal with the United States. Here the author displays his powers of reducing a complex subject to concise, simple statements of remarkable clarity; no new thought or observation is advanced, but every one who reads them will be a better American afterward. That we are citizens of a great nation is a source of pride to us all; that we benefit tremendously from the efficiency of the government we maintain, few of us will deny; that we have solemn obligations to that government and the country is a commonplace, and being so, we are apt to forget it since we are not frequently called upon to render obligations except through the tax collector. Professor Martin wishes that we might impress our youth with a sense of duty to the United States, in which important respect we have much to learn from the dictators. The book cannot be considered of consequence to those who have kept abreast of current international affairs, but as a quick résumé of the questions which fret our troubled world, it will prove interesting and valuable for the busy man. J. M. E.

So Schossen Wir Nach Paris. By Heinz Eisgruber. Published by Otto Schlegel, G. m. b. H., Berlin. 1935.

AGAIN the Paris Gun! The title is promising due to its German origin, and its promise is fulfilled—to an extent.

"How We Fired on Paris" is a "romantic history" written with the avowed intention of edifying the new German Youth, after the years of jealously guarded secrecy, concerning Germany's great attempt at psychological warfare in 1918. The book could be written for this purpose without the inclusion of too much technical detail and the professional reader will be impressed more by the author's fulsome German adjectives than by the new information given.

It is possible that the author intended only to cover in his descriptions the details concerning which foreign writers had already published accurate information. Although he believes that no German has previously described the weapon, it is significant that the principal dimensions as given by him tally remarkably well with those published by foreign writers. His illustrations are not photographs, but reproductions of other writers' sketches. The representation of the complete installation was taken from H. W. Miller's book "The Paris Gun," though the German author's description is contradictory to Miller's drawing in minor particulars. The illustration following most closely his description of the projectile was made by a German war prisoner in a French prison camp! (Appropriate remarks on the technical ability of the German common soldier).

Interestingly described are the efforts of the Krupp engineers, naval officers and the chosen one hundred sailors to emplace the 200-ton gun in the seepy soil of the Bois de Crepy, 128 kilometers from Paris. Final preparations for firing included heavy masking by camouflage and the firing of scattered single guns of all calibers emplaced in the vicinity. The endless drill with the strange instruments necessary for repeated correction of alignment of the long two-piece barrel, and for adjustment of the stratospheric trajectory, are dramatically described. The comments of the all-German gun-crew, in mixed dialect, may add color for German consumption, but seem superfluous to the translator.

Equally superfluous are the conjectured feelings of the surprised Parisians after all preparations have been completed and the first rounds successfully fired. The German hope was father to these thoughts, but Paris is a large city. The explosion of an 8¼-inch projectile with two rather small bursting charges over the large beaten zone can hardly cause metropolitan, let alone national, despair. Furthermore, the author definitely states that the various emplacements discovered after the German withdrawal were built for the single gun manufactured, and not for more, as originally assumed by the Allies. This one gun was only able to discharge

three rounds per hour on firing days until sixty-five rounds had been fired, when a new liner was required. Time between rounds was required not only for normal loading operations, but for realignment of the bore, ballistic corrections and selection of calibrated projectiles. While every effort was made to arrange the projectiles to anticipate barrel wear, unusual wear had to be noted and occasional projectiles discarded, according to this author.

Though the real reason for the gun's first move seems to have been increasing discomfort, the hideout of a possible but not probable enemy agent discovered near the position is given some credit, and the German advance into the Chateau-Thierry salient offered a considerable decrease in the range to Paris from a prepared position near Fere en Tardenois. Though the gun did considerable firing from its second position, the author does not dwell long on this phase and one gathers that the period after leaving Crepy was not a happy one. Continued Allied threats against the Chateau-Thierry salient finally squeezed out the gun with little time to spare.

The final phase is described as a hurried retreat from the third position at Ham near St. Quentin; a struggle to prevent capture by the enemy and delays by rail officials during the long trek to the Rhine and safety. The end of the big gun is left shrouded in mystery. The inquisitive eyes of the Allied commissioners entering the Krupp plant at Essen after the Armistice found only some miscellaneous ingots and scrap which might have been the Paris Gun.

The book "So Schossen Wir Nach Paris" has none of the tone of early post-war German literature, but typifies a new-old German spirit to be instilled in a generation without experience of the horrors of war, but learning now of a Germany which dared to defy the world. T. R. T.

THE AUTOBIOGRAPHY OF JOHN HAYS HAMMOND. New York: Farrar & Rinehart, Inc. 2 vols. 1935.

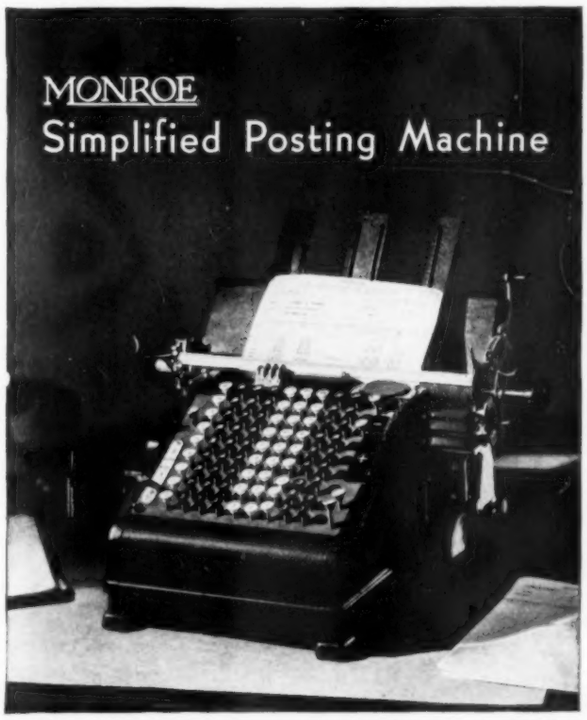
HERE is a book, or rather an historical work, which has been one of the best sellers since its publication. It is the story of the life of a famed mining engineer, a life spent in the midst of exciting and internationally important events. Described by John Chamberlain of the *New York Times* as a tale of "exciting days on the rough edges of the earth and in the great capitals of the powers," it is to international events at the turn of the century what Mark Sullivan's "Our Times" is to the history of the United States over, generally, the same period.

Mr. Hammond's career began in 1855, when he was born in San Francisco, the son of Richard Pindell Hammond, a resigned major of artillery and a graduate of the U. S. Military Academy in the class of 1841. As a boy, he saw the early humble beginnings of that metropolis of the Golden Gate, he lived through the days of the Vigilantes and many times, in Sacramento, saw the arrival and departure of the Pony Express. His first experience as a gold miner came when he was but eleven years old when he panned out some gold in a Chinaman's gold placer claim.

After some education in the public schools of San Francisco, he came east, "preped" for Yale and graduated from the Sheffield Scientific School there in 1876. Deciding to become a mining engineer, he entered the famous Royal School of Mines at Freiberg, Germany, where he spent three years. Returning to the United States in 1879, he joined the U. S. Geological Survey and for six months conducted an intensive examination of the Western mines and collected statistics on that industry.

He married Natalie Harris on New Year's Day, 1881, honeymooned in Washington where his hotel room was secured at a discount by General W. T. Sherman, and where he and his bride were entertained at a dinner at the White House by President and Mrs. Hayes.

After a brief honeymoon, he began his career as a consulting engineer. He examined mines in California, Nevada and Arizona, operated mines in Mexico, explored copper prospects in South America, sold dredges to the French workers on the Panama Canal, obtained for the company by which he was employed the



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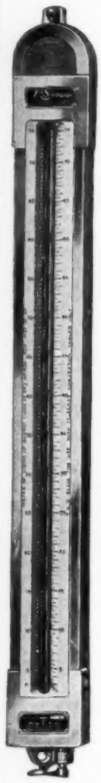

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contract to build the battle ship OREGON, and worked in the Coeur d'Alene district during Moyer-Haywood strife.

A trip to South Africa in 1893, actuated by the belief that the Democratic victory of 1892 would result in a period of industrial depression in the United States, led ultimately to his connections with Cecil Rhodes. In 1894, Mr. Hammond took charge of all of Rhodes' mining interests in the Rand at a salary of $75,000 per year plus a participation in the profits. Imagine that income in 1894 for an engineer not yet forty! His associations brought him into contact with the reform movement in the Boer states, and for his part in the ill-fated Jameson raid he was arrested by the Boers, convicted of treason and sentenced to be hung. This sentence he finally evaded by the payment of a fine of $125,000. His African activities lasted not quite three years. In 1896, he went to London which for the next four years was his home and business headquarters. One of the highlights of these four years was an exploration of Russian mining resources and an audience with the Czar.

In late 1899, Mr. Hammond and his family returned to the United States. He became general manager of the Guggenheim mining interests in 1903, and in this capacity developed mines all over the world.

Mr. Hammond entered politics in the early nineteen hundreds because of his warm personal friendship with William Howard Taft. Although political position and office had been offered to him many times, conditions made acceptance impossible. His relations with Mr. Taft were such that today he would be called "the Colonel House of the Taft administration," whereas in the Wilson regime Colonel House was referred to as "the John Hays Hammond of the Wilson administration." In this capacity, President Taft appointed Mr. Hammond special ambassador to represent the United States at the coronation of George V. He was later appointed the head of a special commission to visit Europe to induce the European countries to participate in the celebration of the completion of the Panama Canal. From 1910 to 1919 Mr. Hammond gave freely of his time and energy to the problem of world peace. His interests in this ideal, however, did not prevent him from supporting preparedness measures, playing his full part in the war effort of the United States and indorsing General Woods' statement that "It is better to be ready for war and not have it, than to have war and not be ready for it."

The remaining five chapters of the book are devoted to comments on the World Court, the League of Nations, the Wilson regime, our Mexican policy, the Harding administration, Coolidge and Hoover. Mr. Hoover he describes as possessing executive ability to an exceptional degree but lacking in leadership. Because of Mr. Hammond's experiences and contacts, his comments on these years of our history are well worth digesting.

A mere recital of the high spots of Mr. Hammond's career does not begin to describe the merits of his autobiography. Written in a most readable manner, replete with witticisms and enlivened with a rich humor, it gives us intimate glimpses of presidents and politicians, soldiers and scientists, explorers and engineers, fashions and finances, mines and miners. As an informal history of the United States and Europe during the period covered it is invaluable to any library, public or private. And certainly, no well-read person should have to confess that he hasn't read it.

R. M.

THE DIPLOMACY OF THE AMERICAN REVOLUTION. By Samuel Flagg Bemis. Published for The American Historical Association. New York: D. Appleton-Century Company. 1935. $3.50.

IN this careful study of eighteenth century statecraft Professor Bemis has condensed a vast mass of correspondence into a concise narrative of the American Revolution as that struggle was viewed in the worldly atmosphere of the European chancelleries. It is a subject with the main points of which the reading public is familiar, so far as they relate to the rebellious Colonies. The fortuitous combination of a bungling British administration, the

surprisingly helpful Bourbons, and the sagacity and enterprise of our own envoys brought about the separation from the British Empire of its most valuable dependencies. For Americans a few facts of diplomacy coupled with the achievements of the Continental Army are apt to obscure the major aspects of the war. But the present study reduces the events in the Western Hemisphere to their true dimensions. The motives of men and of ministers are dissected; the aspirations of Vergennes, the aims of Floridablanca, the dilemma of the trade-hungry Dutch burghers, the circumspect attitude of Frederick the Great, the sharp policy of Catherine II, the plight of George III, these influences are all examined until it becomes apparent that the American Revolution was but a major episode in another world war. Starting with a colonial revolt, the affair quickly developed for Great Britain into a war in defense of her sea power, similar in many respects to the Seven Years' War which had but lately come to a close, a war that was fought again in the nineteenth century, and in the twentieth century, a war that bore at its heart the germ of future wars. Nations engaging largely in commerce have never failed to clash over sea power.

The Bourbons having seized their opportunity to strike at British sea power, the situation of neutrals became perilous, but eventually only the Netherlands were drawn in. Professor Bemis, in his discussion of neutral rights, presents with admirable clarity a subject of extreme importance. Perhaps in the future, when Europe is convulsed with war, it will be possible for us, as some eminent historians have proposed, to insulate ourselves from the strife by means of our protective oceans, to recall our citizens and our ships, to live upon our own resources and to keep in safe harbors until the danger is past. But Americans are a headstrong race, and the chances are that they will want to trade upon the sea as usual, furthermore there is every possibility that in doing so they will demand the protection of their government. This matter of neutral commerce will undoubtedly be troublesome again, particularly with the definition of contraband so thoroughly in the air. In considering the subject of the hazards that accompany commerce and sea power, it is well to remember that Great Britain emerged victorious from the Seven Years' War in 1763, she is generally supposed to have suffered defeat in the war which ended in 1783, but after a short period of peace she was able to contend against the French Revolutionists and Napoleon for twenty-odd years and through all this troublesome period she steadily gained in strength. This resilience did not come from victorious armies or crafty diplomacy, but from the broad base of national power inherent in her industry and commerce.

This book cannot fail to freshen one's admiration for the character and wisdom of the American envoys, Benjamin Franklin, Arthur Lee, John Jay, and John Adams. Negotiations among men, from the legendary field of horse trading to the more eminent realm of international affairs, are apt to become involved with motives that lie among the main-springs of human nature. Skullduggery there must have been, and it is to the eternal credit of our representatives that we got off with our figurative shirt, but it seems that the Sage of Passy was not averse to a little phenagling on his own account for the good of his infant nation.

It is impossible to understand the history of any war without a knowledge of the political moves that led to a resort to force. Our Revolutionary War is fruitful in examples of strategy, several of which depend for a true explanation directly upon the efforts of our agents in London, Amsterdam, Paris or Madrid. Professor Bemis should receive the thanks of all American students of military history for making available this study of our earliest and happiest excursion into the field of diplomacy.

A review of this work would be incomplete without mention of the remarkable maps that are included. These maps make plain in what danger the Thirteen Colonies stood of being confined to the territory east of the Appalachian Mountains. An excellent bibliographical note and an index are convenient and valuable.

J. M. E.

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Factory Organization and Administration. By Hugo Diemer. Fifth Edition. New York. McGraw-Hill Book Co., Inc. 1935. $4.00.

THE rapid and radical evolution in factory organization and production practice that has taken place since Colonel Diemer published the first edition of his book on this subject in 1910 has necessitated frequent revisions to bring it abreast of the times. The fifth edition further emphasizes the social responsibility of management that is a corollary of the present government attitude toward business. Previous editions had already established a sound position of this work as an authoritative and scientific treatment of management problems. It is sufficient to say that in its present form the study of the subject is even more thorough than in the past. Colonel Diemer's practical experience in factory management combined with his long years of teaching this subject has resulted in an unusually broad knowledge of the problems of production and distribution, of organization and handling personnel. This latest edition of the book provides a coördinated treatment of industrial management characterized by close attention to the practical details of factory operation. The author is a distinguished member of the Ordnance Reserve Corps of the Army and a charter member of the Army Ordnance Association.

D. A.

Heroes of the Air. By Chelsea Fraser. New York: T. Y. Crowell Co. 1935.

"IT seems strange to think that a soap-bubble was the first thing that man sent up into the air with a view to flying himself." With this rather astounding statement, this book opens its chronicle of the amazing progress that has been made, largely within the memory of the present generation, in man's effort to emulate the bird.

Prior to the invention of the internal combustion engine, aviation had been limited to free ballooning. This led, at the turn of the century, to the production of the airship in the development of which the names of Santos-Dumont and Count Zeppelin are prominent and familiar.

It seems to be established that Prof. S. P. Langley really created the first heavier-than-air flying machine, when in 1896 he achieved a sustained flight of some three-quarters of a mile with a model airplane driven by a naptha-burning steam engine. Success with a full-sized man-carrying replica of this model had not been accomplished before Prof. Langley died a few years later.

Experiments with gliders first engaged the attention of the Wright brothers. Finally, with the development of a 16-horsepower four-cylinder gasoline engine driving two propellers, in an aircraft weighing a little over 200 pounds, these brothers made successful flights on December 17, 1903, at the Kill Devil sand hills near Kitty Hawk, N. C. In one flight the plane arose of its own power, was in the air 59 seconds and traveled 852 feet. Thus did the Wright brothers effect the first instance of a man being carried from the ground by mechanical means alone.

The development of airplanes prior to the World War was slow. The names of Curtiss, Bleriot, and Hamilton—to mention a few—stand out brilliantly in these early days. The part played by aviation in the World War, the stimulus the war provided for aircraft development and the glamor that soon surrounded aviation are too recent to need recounting; and so also are the conversion of military types of airplanes to the uses of commerce, the development of commercial air lines in Europe, and the backwardness of the United States along those lines.

The urge for military supremacy in the air led directly to the first really long distance flight which was accomplished by the United States Navy in May, 1918, when a squadron of its N-C (Navy-Curtiss) flying boats flew from Rockaway Beach to England via Newfoundland, the Azores and Portugal. A few days after the completion of this flight, two Britishers—Alcock and Brown—made the first transatlantic non-stop airplane flight from St. John's, N. F. to Clifden, Ireland, thereby winning a prize of $50,000, posted some six years before by the *London Daily Mail.*

Meanwhile, the British dirigible R-34 had flown from Dublin, via Newfoundland and Nova Scotia to Mineola, Long Island and then, after a brief stay in the United States, directly back to England. The only American aboard this airship on this cruise was Lt. Comdr. Lansdowne, later to lose his life in the crash of the SHENANDOAH.

For almost four years, aviation seemed to be slumbering. Then in 1923, things began to happen, more things happened in 1924, and every year since then has seen more, bigger, and better aërial achievements. Kelly and Macready's non-stop flight across the continent, the Army's round-the-world flight, Maughan's solo flight from dawn to dusk from New York to California, the trips of the SHENANDOAH and LOS ANGELES, the Navy's attempt to fly to Hawaii, the Arctic flights of Byrd, Bennett, Amundsen, Ellsworth and Nobile, and finally Lindbergh's feat in 1927. And so the chronology goes on to include the Pacific cruises of the "Clipper" ships of the Pan-American Airways, Inc., and the flight of 46 naval flying patrol boats over Hawaiian waters in 1935.

Separate stories, replete with interesting details and thrilling episodes are devoted to many of the early pioneers but as the aërial trail blazers became more numerous, space prevented more than a bare recital of some of their feats. It would require more than a book fully to portray the accomplishments of the Lindberghs. The records garnered by Amelia Earhart merit a book by themselves. The stories of Post, Gatty, Amy Johnson, Doolittle Mollison, von Gronau, Roscoe Turner, Maitland, Hegenberger, and Balbo would fill volumes. No story of aviation would be complete without accounts of the stratosphere flights and so the ascents of Piccard, Settle and others are duly and accurately related.

To this reviewer, however, more fascinating than these stories of accomplishments in motor-driven airships and airplanes of one sort or another in every part of the globe, are the accounts of the accomplishments of motorless gliders, moved only by air currents, like the soaring bird man has so successfully rivalled. It may therefore be surprising to read that, in 1934, a glider flew from Elmira, N. Y., to Somerset, N. J., a distance of 155 miles, was in the air 5 hours and 50 minutes, and varied in altitude from less than 200 feet to more than 3000 feet. The outline maps which accompany each story add greatly to the enjoyment of this exceedingly interesting book. R. M.

OUTLINES OF THE WORLD'S MILITARY HISTORY. By Col. William A. Mitchell. Harrisburg, Pa.: Military Service Publishing Company, 2nd Edition. 1935. $3.00.

THE military history of the world in its broadest aspect includes a study of warfare on land and sea, with an investigation of the strategy involved, the tactics employed, and the logistics of the various campaigns. Furthermore, the type of military organization, the art of the military engineer and ordnance expert, and the limitations or skill of the medical service as these elements affect tactics are of vast importance in changing the character of warfare through the centuries. Nor can the psychology and character of the leaders be ignored. It is, therefore, no mean task to compress all these elements into a single volume and make the result readable, accurate, and satisfying. But this has been done by Colonel Mitchell with commendable success. Over three thousand years of military history, dating from little known events prior to the siege of Troy, down to November 11, 1918, pass in review in a narrative enlivened by excellent maps and sketches. The weapons employed throughout the ages are described and shown in illustrations. The changing types of fortifications and siege works are likewise depicted in ample detail. Military organization is treated with special reference to staff systems; training and preparation for war are correlated with the results obtained in campaigns.

In his preface Colonel Mitchell mentions the necessity of omitting from his history many military events. The campaigns selected for consideration have been chosen with admirable com-

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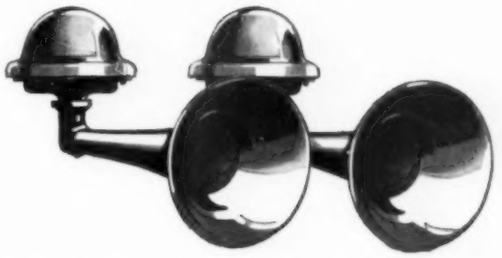

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petence to achieve the purpose of the work. Every reader will undoubtedly observe the slighting of certain events which he regards as of paramount importance in military history. This reviewer, for instance, regrets that there is so little mention of Scipio's successful campaign against Hannibal in Africa and of Sherman's strategic offensive as combined with his defensive tactics. The book, however, is preëminent in its field and merits inclusion in all military libraries. D. A.

HEIGL'S TASCHENBUCH DER TANKS. By O. H. Hacker, R. J. Icks, O. Merker and G. P. v. Zezschwitz. Munchen: J. F. Lehmanns Verlag. 1935.

FRITZ HEIGL'S tank handbook has become a standard reference work throughout the world. Originally compiled by Dr. Heigl after the World War and, until his death, issued by him in several revised editions, the work is now carried on by a group of engineers and students. Among the authors who have collaborated in the present revision are Lieutenant Icks, who has contributed articles to this Journal for many years on tank and other military automotive subjects, and the well known Colonel Hacker, European authority on automotive engineering. This volume, Part II of the 1935 edition, is quite the best and most complete issue of the handbook that has yet appeared.

Taschenbuch der Tanks, like many other handbooks published in Europe, is replete with detailed information and illustrations. In this respect it is similar to other publications of J. F. Lehmanns Verlag, *Taschenbuch der Kriegs Flotten* and *Taschenbuch der Luft-Flotten.* This volume describes the automotive fighting vehicles, tanks, armored cars, scout cars and self-propelled gun carriages used by the armies of practically all nations of the world. The data on the equipment of the United States Army are most complete in that many development types now obsolete and characteristics of some of the current types are included. Many of the designs during the early part of the decade 1920-30 are shown by illustration and description presenting a record not only of standardized vehicles but also of the evolution and later discarded attempts. The use of the silhouette throughout the volume gives the reader an instant view of the general lines of the several vehicles. The volume contains 720 pages of which 111 pages and 124 illustrations are devoted to past and present equipment of the United States Army. The treatment of tank development in other countries is equally impressive. For tactical and technical reference *Taschenbuch der Tanks* is quite essential. O. E. D.

The Index and Title Page (for binding) of the last volume of ARMY ORDNANCE *(July-August 1934 to May-June 1935) are available for distribution. Copies may be had, without charge, upon request to the Editorial Office.*

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